TM 11-927

WAR DEPARTMENT TECHNICAL MANUAL

POWER UNIT

PE-108 (A, B, C, D & E)

WAR DEPARTMENT • 8 JANUARY 1944

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TM 11-927, Power Unit PE-108 — A, B, C, D and E , is published for the information and guidance of all concerned.

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(For explanation of symbols see FM 21-6.)

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DESTRUCTION NOTICE

WHY—To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW—1. Smash—Use sledges, axes, hand-axes, pick-axes, hammers, crowbars, heavy tools, etc.

2. Cut—Use axes, hand-axes, machete, etc.

3. Burn—Use gasoline, kerosene, oil, flame-throwers, incendiary grenades, etc.

4. Explosives—Use firearms, grenades, TNT, etc.

5. Disposal—Bury in slit trenches, foxholes, other holes. Throw in streams. Scatter.

6. **Use anything immediately available for destruction of this equipment.**

WHAT—1. Smash—Engine cylinder head, cylinder, crankcase, carburetor, generator frame, magneto, air filter, muffler, fuel filter, battery and control box.

2. Cut—Exhaust tube, power cables, remote control cables, armature and field windings, and all other wires or cables in or on the unit.

6. Bend and/or Break—Gasoline tank, base, all chests and cases.

4. Burn—All wood chests, and cases, manuals, wire, cables, oil and fuel.

5. Bury or Scatter any or all of the above pieces after breaking.

DESTROY EVERYTHING

SAFETY NOTICE

1. **Do not attempt adjustments or changes on wiring while Power Unit PE-108-(*) is in operation. Disconnect the remote control before working on this unit. This unit generates high voltage, so that severe and possibly fatal shocks may be encountered especially when power unit is operating on wet or damp ground.**

2. **Sufficient and proper ventilation must be provided, if the power unit is operated in a confined space. Exhaust gases produced are poisonous, and excessive inhalations may result in severe sickness or death.**

3. **Do not service with gasoline while power unit is running or if a radio transmitter is operating in close proximity to power unit.**

4. **Operator should observe every standard safety regulation while operating this power unit.**

5. **Stop the unit before removing the gasoline tank filler cap. Avoid spilling gasoline on a hot engine.**

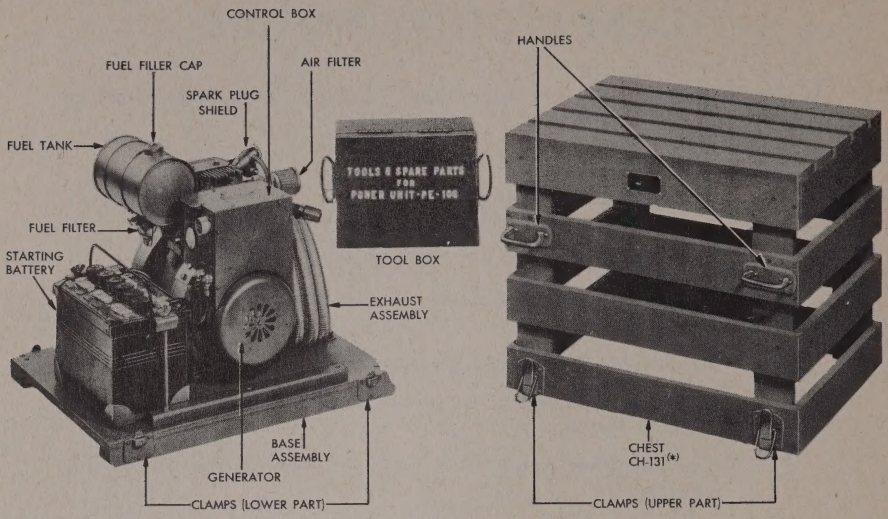

FIG. 1

PE-108-B, C [GENERATOR END]

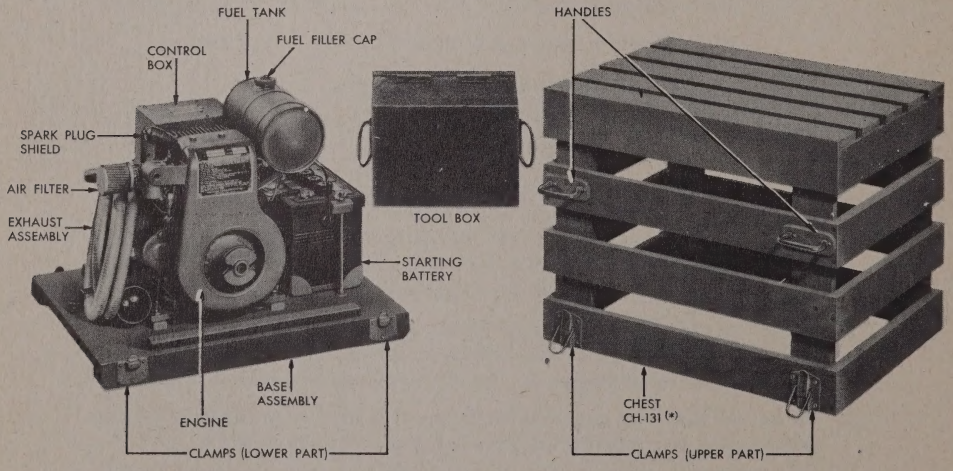

FIG. 2

PE-108-B, C [FLY WHEEL END]

SECTION I
Description

1. GENERAL

NOTE: At the time of printing this Technical Manual five models of Power Unit PE-108-(*) have been produced or are in production. These are Power Units PE-108–A, PE-108-B, PE-108-C, PE-108-D, and PE-108-E. So far as performance, weights, dimensions, and purpose are concerned, all are identical. The several models differ only in design changes or in material changes caused by shortages. The nomenclature covering the tool box, which is a component of the equipment, has changed accordingly. Chest CH-131-(*) carried suffix letter A for PE-108-B, suffix B for PE-108-C and suffix C for PE-108-D and PE-108-E. All models of PE-108 are covered in this manual, but for practical purposes models B and C—which are identical except for nomenclature—are considered as standard, and all other models are identified by the details in which they differ from B and C. The components of all models are identified by the suffix letters following the designation PE-108 on the nameplates. Unless otherwise specified the designation PE-108-(*) in this manual will refer to all models. See Figs. (1, 2, 3, 4).

a. **General Description.**—Power Unit PE-108-(*) is a portable gasoline engine-driven generating set, of the remote control starting type, complete with starting battery; all components are mounted on a suitable wooden base, and the complete equipment is enclosed in a case, Chest CH-131-(*), which clamps to the base. PE-108-(*) is primarily a component of Radio Set SCR-543-(*), but is adaptable to other uses.

This power unit consists of a single-cylinder, air-cooled engine, a direct-mounted, self-excited a-c/d-c generator, a control box mounted on the generator, and a 12-volt starting battery. All components are securely mounted to the sub-base and are readily available and accessible. A box of suitable tools and replacement parts is furnished with each unit (packed separately with replacement parts for SCR-543-(*) in the case of PE-108-(A, B, C and D); packed inside Chest CH-131-C in the case of PE-108-E.

b. General Characteristics.—Power Unit PE-108-(*) is designed to produce 110 volts a-c, 600 watts, 60 cycles, single phase, plus sufficient amperage at 12/15 volts d-c to maintain the starting battery in a fully charged condition.

2. MAJOR COMPONENTS.

a. List

ARTICLE	LENGTH	WIDTH	HEIGHT	WEIGHT POUNDS
1. Power Unit PE-108-(*)	30¼	27½	26½	336
LIST OF COMPONENTS				
(1) Engine	15¼	15 9/16	18¾	83½
(2) Generator	8½	10⅞	10⅞	65
(3) Control Box	9½	8¼	8½	8½
(4) Chest	28	23¾	24⅞	65
(5) Tool Kit	13	9¾	6⅛	16
(6) Storage Battery	14⅜	7⅜	9⅝	51¾
(7) Fuel Tank	10⅛	6	6¾	2
(8) Exhaust Assembly	15½	15½	4½	5⅛
(9) Spare Parts Group				566 Total
(a) Gas Engine Group	39	26	14	212
(b) Gen. Parts	21	16	11	49
				61 Ea.
‡ (c) 5—Batteries	17	11	9	Total 305

‡Dimensions and Weights are for each battery.

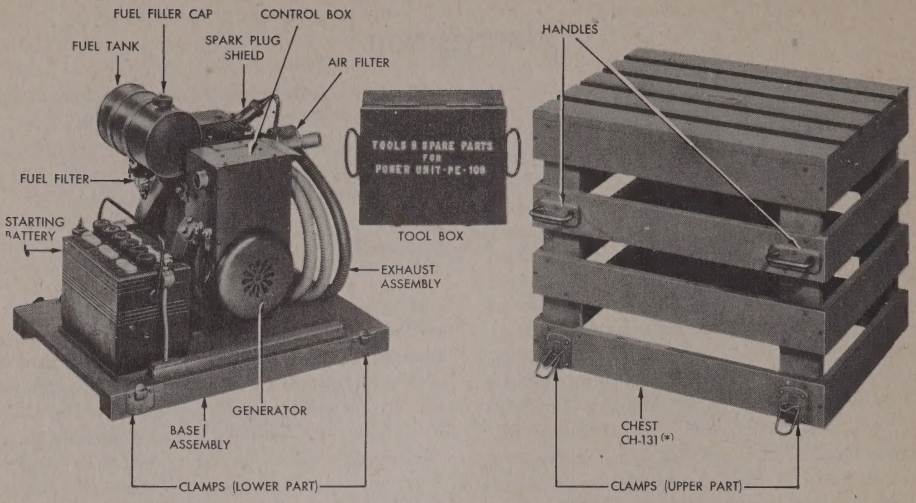

FIG. 3

PE-108-A [GENERATOR END]

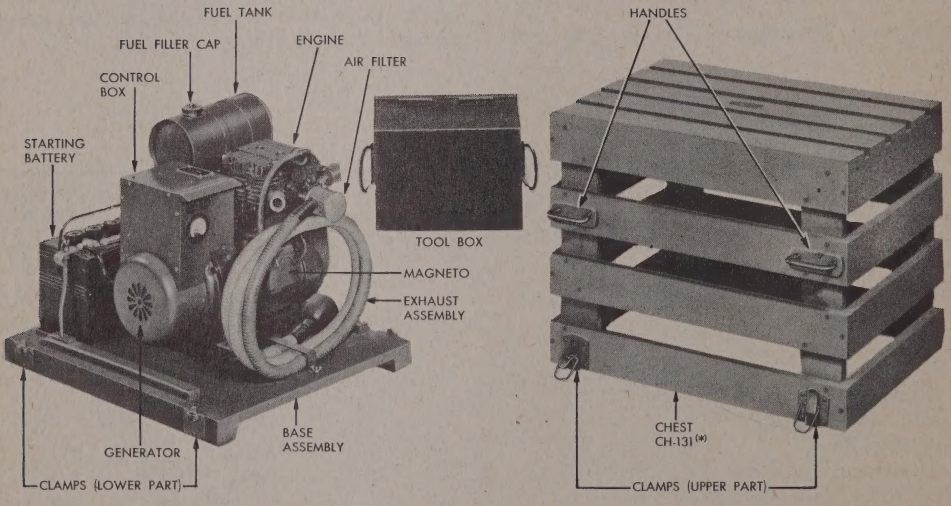

FIG. 4

PE-108-A [EXHAUST SIDE]

Section I

3. DETAILED DESCRIPTION — COMPONENTS.—a. Engine.—The engine of Power Unit PE-108-(*) is a single-cylinder, 4-cycle, air-cooled type with float feed carburetion, 1-gallon fuel tank, and impulse-type magneto ignition. The ignition system is completely radio shielded. The engine used on models PE-108-(A, B and C) is rated 1.4 horsepower at 1800 rpm, with a bore of 2¼ in. x 2¾ in. stroke. Units D and E use an engine rated at 2.3 horsepower at 1800 rpm, bore 2½ in. x 2¾ in. stroke. Except for the cylinder, cylinder head, piston, rings, piston pin, air filter, flywheel, and a few minor parts, these engines are alike, and other parts are interchangeable.

b. Generator.—The generator is a 4-pole, dual-wound type delivering 110 volts a-c, 60 cycles, single phase, plus 12/15 volts d-c for charging the starting battery. Operation is at 1800 rpm. The generator armature rotor is mounted directly upon a tapered extension of the engine crankshaft.

c. Control Box.—The control box is mounted on top of the generator, and contains the following items: a-c voltmeter (M3), d-c ammeter (M4), (PE-108-D and PE-108-E only), dual a-c socket (SO5), d-c multiple terminal socket (PL7), d-c battery terminals, d-c and a-c radio interference filter, starting relay (RY5), reverse current cutout (RY6), d-c resistor (R73), a-c circuit breaker (RY7) (PE-108-D only), toggle switch (S14) with dual resistors (R73 and R75), and starting push button (S15), (PE-108-E only). (See Figs. 5 to 8.)

d. **Fuel Tank.**—A cylindrical, 1-gallon capacity fuel tank is mounted on top of the engine. The unit uses approximately .3 gallons of fuel (PE-108-A, B, C) or .4 gallons (PE-108-D) per hour at full rated load. Thus, one filling of the tank is sufficient for 2½ to 3 hours of operation.

e. Battery-Starting.—Power Unit PE-108-(*) is designed primarily for Remote Control starting through Radio Set SCR-543-(*), details of which are given in Section II, Paragraph 6. For this method, the battery is permanently connected through the control box to the generator (the d-c winding of which acts as a starter when the remote control equipment is used). The battery is a 12-volt 60 ampere-hour, rubber separator, dry-charged type for Power Units PE-108-(A, B and C); moist wood separator, uncharged type for PE-108-D and PE-108-E.

> **NOTE: PE-108-(*) is equipped for auxiliary rope-pull starting, and can be started and operated without any storage battery. (See Section II, Par. 6). Also, PE-108-E is equipped with a push button for starting at the unit.**

f. Base Mounting.—Power Unit PE-108-(*) is mounted on a plywood base by means of special shock-absorbent rubber mountings. To this base are also clamped the battery, and the muffler and exhaust pipe assembly. The whole unit is covered by a carrying case (Chest CH-131-(*)), which is attached to the base with four clamps, and is equipped with four handles for carrying.

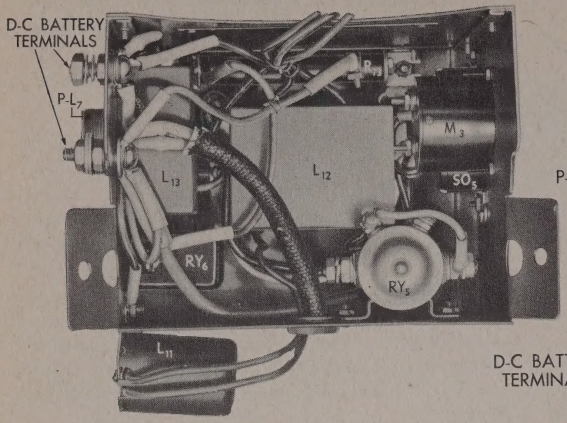

FIG. 5
INTERIOR CONTROL BOX-PE-108—A

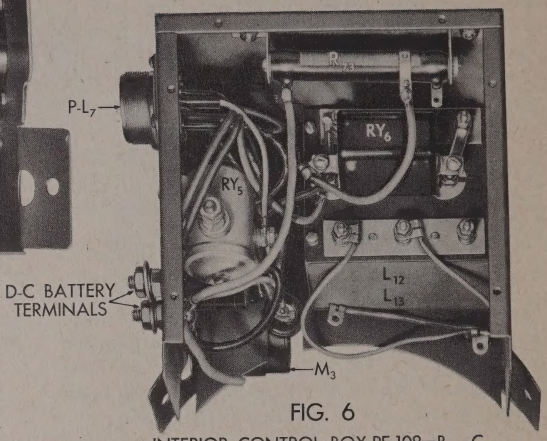

FIG. 6
INTERIOR CONTROL BOX-PE-108—B, C

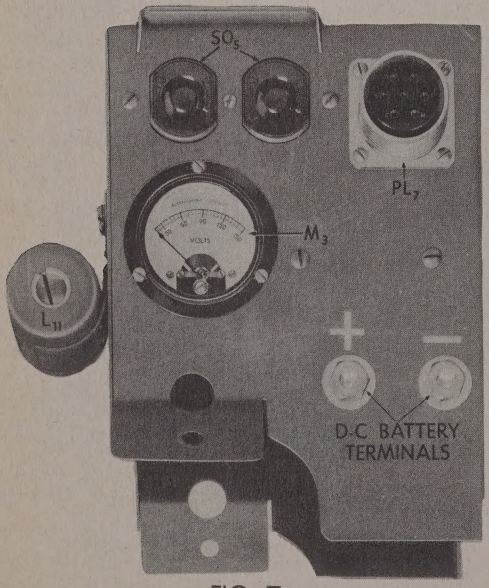

FIG. 7
EXTERIOR CONTROL BOX-PE-108—B, C

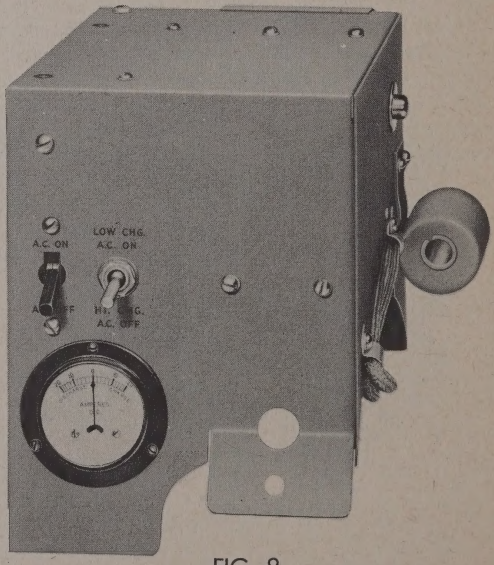

FIG. 8
EXTERIOR CONTROL BOX-PE-108—E

SECTION II
Installation and Operation

REMEMBER THESE POINTS!

1. Don't attempt repairs or adjustments to this unit unless you are sure what you're doing.
2. Watch your lubrication; check the oil level every 5 hours.
3. Don't take chances with carbon monoxide; keep your exhaust line gas tight and be sure you have proper ventilation.
4. Be sure there is no dirt in your oil and gasoline.
5. Keep your air filter clean. Watch this closely in dusty locations.
6. Keep the unit as clean as possible. Dirt on the cooling fins and in the air passages will cause overheating.
7. Don't expose your unit to rain or dampness. Electrical equipment and water don't mix.
8. Look out for shock. Don't touch exposed wires.
9. Go over your unit daily and tighten all screws and nuts.
10. Don't spill gas on your unit when filling the tank. It may catch fire.
11. Always warm up your unit before applying a load.
12. Study this book. Keep it handy. It'll save you plenty of headaches.

4. INSTALLATION.—a. Uncrate Chest CH-131-(*) carefully and inspect for any damage caused in shipment. If your PE-108-(*) is enclosed in a moisture vapor barrier (a moisture-proof bag), tear this off and remove Chest CH-131-(*) from the skids on which it is mounted. Remove and discard the bags of Silica-Gel packed with it. Remove the dehydrating plug from the spark-plug hole and insert the spark plug. Remove all water-proof paper and tape used in protecting the unit in shipment. (Note: These instructions apply only to models D and E.)

b. Set up and operate the power unit in as level a position as possible.

c. See that all bolts are tight and that the base is fastened down rigidly if the power unit is used in a moving vehicle.

d. See that all apertures—ventilator openings—are clear of obstructions.

e. If power unit is being used with Radio Set SCR-543-(*), make connections of cable as outlined in paragraph 6. (See Figure 9.)

f. Before starting the engine fill the base with a good grade of oil. The body of the oil should be as follows:

Temperature	Oil
Above 32°F.	S.A.E. 30
32°F. to 0°F.	S.A.E. 10

Below 0°F. dilute S.A.E. 10 with 1% gasoline for each degree below 0°F. Total dilution must never exceed 40%.

Never use an oil heavier than S.A.E. 30. Put in oil to the top of the filler plug opening in the engine base.

g. Fill the air cleaner container with the same S.A.E. grade of oil used in the crankcase except do not use the diluted mixture. Fill only to the mark indicated on the outside of the container. Be sure to replace air cleaner cap securely.

h. Fill the fuel tank with gasoline free from dirt and water. Use a funnel with a chamois as a filter if gasoline is contaminated with water or other foreign matter.

i. Check the filter bowl and screen, and clean if necessary. Open fully the fuel valve on the filter bowl. Be sure the bowl is tight and does not leak around the gasket.

j. Check all mechanical connections. See that all nuts, bolts, screws, etc., at generator, control box, and engine are tight.

k. Check all electrical connections. See that all power and control cord terminals as well as ignition and battery cables are tight.

l. SERVICE THE STARTING BATTERY AS FOLLOWS:

(1) Remove the vent caps from the cells and

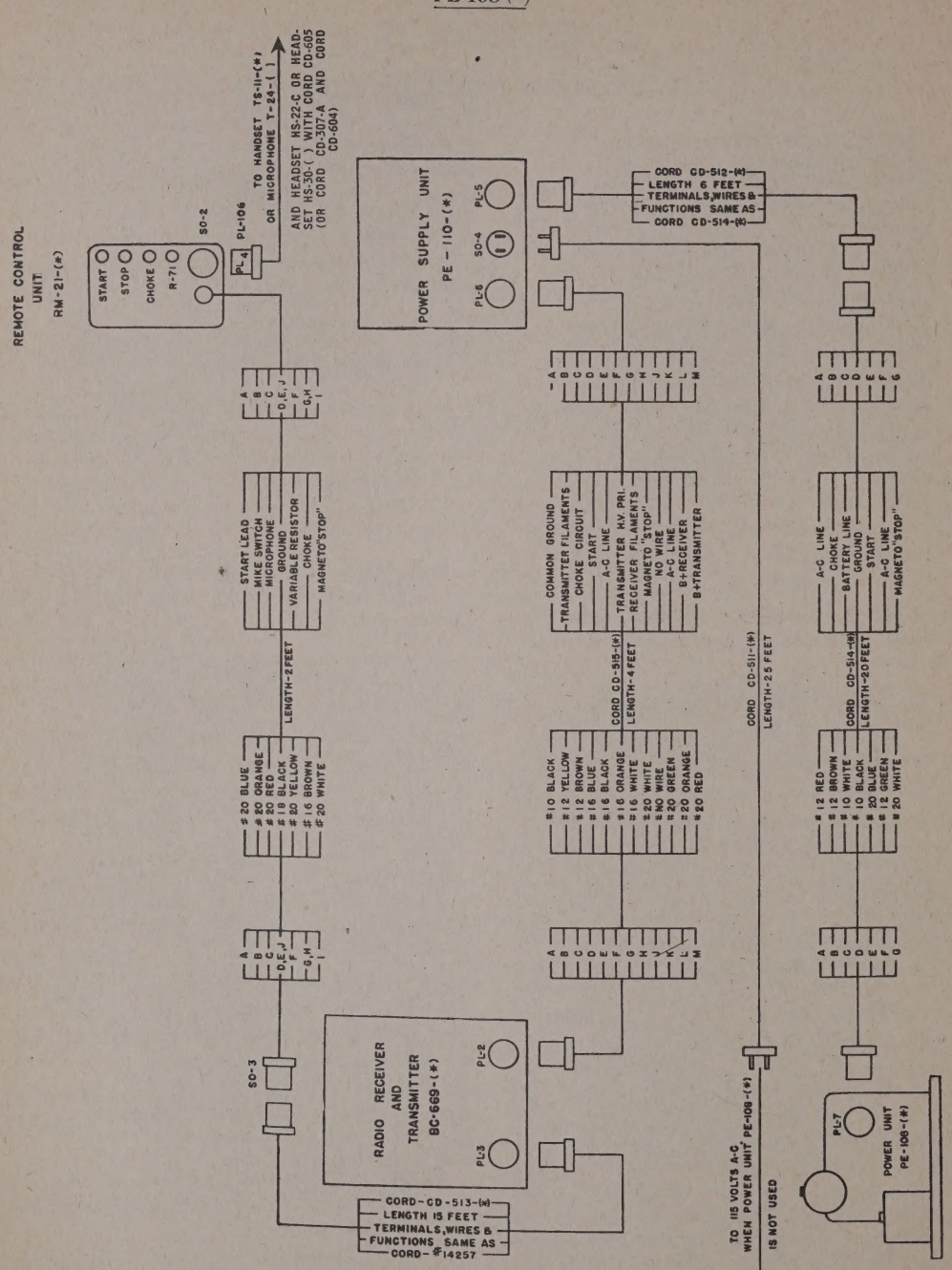

FIG. 9—CORDING DIAGRAM
FOR USE WITH SCR-543-(*)

fill each cell with electrolyte until the level is seen rising in the filler well. The electrolyte used is sulphuric acid of specific gravity for 1.240 for tropical climates, 1.275 for temperate climates.

CAUTION!
Handle Electrolyte With Care
It is a Powerful Acid!

2. If the battery is of the dry charged type, allow it to stand for two hours and it is ready for service. (Note: Battery has tag attached indicating type of charge.)

(3) If the battery is of the moist wood separator type, charge at a charging rate of 3 to 5 amperes (normal rate of low charge for which the unit has been adjusted at the factory), without applying any a-c load. Maintain this rate of charge until the cells register a potential of 2.5 volts or more per cell for 6 consecutive hours. The voltage must remain constant during that time. The temperature should not exceed 110°F. If it does, reduce the charging rate until the temperature drops below 105°F.

(4) The specific gravity of the electrolyte in the cells at the end of the charge should be between 1.240 and 1.250 at a temperature of 70°F. Use only distilled water to adjust electrolyte. Securely replace vent caps.

m. Attach flexible exhaust pipe extension to exhaust port of engine and check all connections. Tighten securely. Remove the rolls of asbestos tape and iron wire from the TOOLS AND SPARE PARTS box. (Note: When PE-108-(*) is furnished with SCR-543-(*) this box is in Chest CH-73-(*)). Wrap the asbestos tape around the exhaust pipe extension, securing it with iron wire, as protection against burning the hands on the hot pipe.

5. INSTRUCTIONS FOR USE OF PE-108-(*) WITH RADIO SET SCR-543.

a. Uncrate Chest CH-133-(*) containing radio receiver and transmitter BC-669-(*) and inspect for any possible damage during shipment. Do the same with Chest CH-132 containing Power Supply Unit PE-110-(*) and Chest CH-131-(*) containing Power Unit PE-108-(*) and Chest CH-73-(*). A box containing bottles of electrolyte for the storage battery may be included.

CAUTION!
HANDLE THE ELECTROLYTE WITH CARE
IT IS A POWERFUL ACID!

b. Other considerations. Radio Receiver and Transmitter BC-669-(*) has been equipped with crystals and pretuned to the frequency channels outlined in paragraph 8. *g.* TM 11-625. No further adjustment is necessary unless operation on other channels is required.

c. Radio Set SCR-543-(*) may be used as a field radio station on the ground or as a vehicular radio station in any suitable vehicle. In sub-paragraphs d, e and f, directions are given for the following installations:

(1) As a field station.

(2) In a ½-ton pick-up truck.

(3) In a ¾-ton command and reconnaissance car.

d. **Installation as a Field Station**—The simplest installation is the field station. For this reason, this type of installation is best for instructing new personnel until familiar with Radio Set SCR-543-(*).

(1) Set up Radio Receiver and Transmitter BC-669-(*), Power Supply Unit PE-110-(*) and Power Unit PE-108-(*) in operating position. Figure 2 in TM 11-625 shows a recommended arrangement.

(2) Unlatch and remove all covers.

(3) If it is not desired to carry Chest CH-73-(*), open lid and remove the following:

(a) Remote Control Unit RM-21-(*) in carrying case.

(b) Mast Base MP-37 mounted on Mast Bracket MP-50.

(c) Roll BG-56-A containing Mast Sections MS-49, MS-50, MS-51, MS-52, MS-53, and MS-54.

(d) Guys GY-11 and GY-12 (if MS-54 is to be used).

(4) Remove Remote Control Unit RM-21-(*) from carrying case and hang the unit on the carrying handle on left side of Chest CH-133-(*). Insert plug on cord of the remote control unit into receptacle PL in front of the transmitter and screw the plug locking ring on by hand as far as it will turn.

(5) Remove from the upper compartment of Chest CH-132-(*) the following:

Cord CD-515-(*)
Cord CD-512-(*)

(6) (a) Insert one end of Cord CD-515-(*)

into receptacle PL on the front panel of Radio Receiver and Transmitter BC-559-(*), and tighten the locking ring. In the same way connect the other end with receptacle PL on the front panel of Power Supply Unit PE-110-(*).

(b) If you want to operate Power Unit PE-108-(*) at a greater distance from the operating position, remove Cord CD-514-(*) from Chest CH-132-(*) and insert in series with Cord CD-512-(*) and Power Unit PE-108-(*). This reduces the noise from the power unit which can be further reduced by stretching the exhaust pipe as far away from the operating position as possible.

(c) If you want to operate Remote Control Unit RM-21-(*) at a distance from the transmitter, remove Cord CD-513-(*) from Chest CH-132-(*) and insert it between the cord attached to Remote Control Unit RM-21-(*) and Receptacle PL on Radio Receiver and Transmitter BC-669-(*).

(d) In the event that radio frequency potentials (indicated by sparks, shocks or burns) should appear on Remote Control Unit RM-21-(*) when Cord CD-513-(*) is used, ground the remote control unit by attaching one end of a wire to one of the captive thumb screws on the front panel of Remote Control Unit RM-21-(*). Attach the other end of the wire to the nearest external ground. Keep this ground wire as short as possible.

In case of rain, replace and latch the covers on Chests CH-132-(*) and CH-133-(*) and bring the cords out through the openings.

e. **Installation in ½-ton Pick-up Truck.**

(1) Locate chest CH-131-(*) about two feet in back of chest CH-133-(*) on the floor of the truck, and remove cover. Install cord CD-512-(*) into receptacle PL-7 of Power Unit PE-108-(*). The other end inserts into PL-5 on the front panel of Power Supply Unit PE-110(*).

(2) Remove the roll of asbestos tape and iron wire from the "Tools and Spare Parts Box" for PE-108-(*).

(3) Wrap the asbestos tape around the exhaust pipe extension, securing it with the iron wire.

(4) Remove the exhaust pipe extension and feed it through the slots in chest CH-131- A , or CH-131- B (if either chest is used) and replace exhaust pipe extension.

(5) Replace the chest.

(6) If chest CH-131- C is used, open cleat on the chest cover marked PULL and feed exhaust pipe through slot.

(7) Tie the exhaust pipe extension to the exterior of the vehicle with the iron wire furnished.

(8) Put up truck's rear platform and fasten in place.

f. **Installation in ¾-ton Command and Reconnaissance Car.**

(1) Place Chest CH-131-(*) containing Power Unit PE-108-(*) on top of rear seat as far to the right as possible and remove Chest CH-131-(*). If installation is to be anything but very temporary, a simple wood platform of 2 x 4 lumber should be built over the seat with two legs extending to the floor. The power unit may be placed on this.

(2) Remove the roll of asbestos tape and iron wire from the Tools and Spare Parts Box for PE-108-(*) in Chest CH-75-(*).

(3) Wrap the asbestos tape around the exhaust pipe extension, securing it with the iron wire.

(4) Remove the exhaust pipe extension and feed it thorugh the slots in Chest CH-131-(*), and replace exhaust pipe extension.

(5) Replace Chest CH-131-(*).

(6) Tie the exhaust pipe extension to the exterior of the vehicle with iron wire furnished.

(7) Tie Chest CH-131-(*) containing Power Unit PE-108-(*) down to the seat with straps or rope to prevent it from jumping out while the car is in motion.

Note: When Power Unit PE-108-(*) is disconnected from the other components of Radio Set SCR-543-(*) it may be operated for test or other purposes. Once in operation, it may be stopped by pressing the stop switch located on the magneto housing directly below the exhaust pipe outlet.

6. OPERATION.

CAUTION:

This power unit generates an a-c voltage which can cause deadly shock. Do not make changes in electrical connections while unit is running!

a. Ventilation.—Be sure that there is an ample

flow of air around the unit so that it does not overheat. If you operate it indoors, see that the exhaust pipe is led outside to permit exhaust gases to escape.

BEWARE of Deadly Carbon Monoxide!

b. Starting the Power Unit.—See paragraph 4, INSTALLATION, before attempting to start the unit. Be sure that all the requirements of that paragraph are fulfilled. There are three methods of starting Power Unit PE-108-(*), as follows:

(1) REMOTE CONTROL STARTING.—Power Unit PE-108-(*) is usually used with Radio Set SCR-543-(*). Make all connections as indicated in paragraph 4 (See figure 9). Then:

(a) Press the START button on Remote Control Unit RM-21-(*) and hold closed until Power Unit PE-108-(*) starts. The power unit should come up to an even speed and run smoothly; both Transmitter and Receiver pilot lamps on the modulator should light indicating that both are ready for operation.

(b) Release START button. Note: If the power unit is cold, it may be necessary to press CHOKE button on the remote control unit while pressing START button, until engine starts.

(c) CAUTION: Except in cases of extreme emergency, under low temperature conditions operate the unit for not less than ten minutes before applying load.

(d) To stop PE-108-(*), press STOP button on remote Control Unit RM-21-(*) or in an emergency, press STOP button on the engine blower housing, until the power unit has come to a complete stop. (The battery is automatically switched on and off as the power unit is stopped or started.)

(2) PUSH BUTTON STARTING.—Power Unit PE-108-E only is equipped with a push-button starter on the control box. (See figure 8). To start by this means, close the choke valve located on top of the carburetor, press the START button, release the choke valve after the engine has turned over a few times, and continue to hold the START button depressed until the engine starts. If the unit does not start in about 30 seconds, release the START button and refer to the trouble chart, page 35. To stop, press the magneto shorting button located on the blower housing of the engine on the side opposite the magneto, and hold the button firmly in until the engine comes to a dead stop.

(3) ROPE-PULL STARTING. — a. If the battery becomes discharged, any Power Unit PE-108-(*) can be started by means of the rope-pull starter. Place knotted end of starting rope in the notch of the starting sheave on the end of the engine **opposite** the generator, and wind the rope around the sheave several times in a clockwise direction. Pull briskly on the rope—do not jerk—to turn the crankshaft. Choke if engine is cold, as indicated in paragraph (2) above. If the engine does not start at once, repeat the operation. STOP as indicated in paragraph (2) above.

Note: To insure maintenance of proper polarity in the generator, it is advisable to hold in the START button on Remote Control Unit RM-21-(*) or on the power unit itself at the same time that rope starter is used.

b. If Power Unit PE-108-(*) is left inoperative for a short period of time, the following precautions should be taken.

(1) Let the unit run until the storage battery is completely charged after filling each cell to the proper level with distilled water.

(2) Stop the unit by shutting off the fuel supply. Do not press STOP button.

(3) Drain gasoline from tank and sediment bulb to prevent any possibility of leakage.

(4) Coil up exhaust hose and secure under bracket provided for it on platform.

(5) Cover unit with Chest CH-131-(*).

(6) Cover chest with canvas or heavy paper, or, if shipping box is available, place unit in box and close. This will help prevent rust and corrosion.

7. FAILURE OF ENGINE TO START.

a. If the engine will not start after repeated application of the rope starter, the following points should be checked—check the spark plug to see that no foreign matter is between the points. Check to see that the spark plug wire is connected to the magneto and also to the spark plug and that these connections are clean and tight. The spark plug wire should also be checked to see that it is not punctured at some point and possibly shorted. The magneto breaker cover should be removed and the breaker points checked to see that the opening is .020 in. and also see that these points are clean and free from foreign matter. (See figure 18.)

b. Next check to see if the fuel line from the fuel strainer is obstructed by loosening the connection at the carburetor with the shut-off valve in the fuel strainer closed. After the fuel line is loosened at carburetor open the shut-off valve in the fuel strainer and see that the gas flows freely through the line. If it is found that some obstruction is present, this may be removed by blowing out the line with compressed air after it has been removed from the engine. Next check to see that the air vent hole in the gasoline cap is open. This may be determined by blowing through the hole. If this hole is plugged, the obstruction may be removed by some sharp pointed instrument.

c. If the engine still will not start, refer to trouble chart, page 35.

SECTION III
Functioning of Parts

8. REFERENCES.

Complete information on the functioning of internal combustion engines, and on carburetion and ignition systems may be found in the following technical manuals:

TM 10-570 The Internal Combustion Engine.
TM 10-550 Fuels and Lubrication.
TM 10-580 Automotive Electricity.

9. GOVERNOR ACTION.

The magnetic governor (Fig. 11), is located on the generator side of the engine and is mounted on the control box (Fig. 7, L 11). It maintains a function of operating the engine at a constant speed in conjunction with the mechanical governor which operates as follows: The governor gear meshes with the camshaft gear. The centrifugal force moves the weights toward or away from the shaft. The action of the weights moves the operating fork riser, against which the operating fork is pressed. This fork connected to the governor arm by the operating shaft moves the arm according to the pressure of the fork riser against it. The arm in turn acts on the carburetor throttle (Fig. 16, item 6) to regulate the speed of the engine. The magnetic governor (Fig. 11) is controlled by the load on the generator. As the load on the generator increases, an alternating current from the field circuit of the generator passes through the windings (Fig. 11, item 1) of the magnetic solenoid, creating a strong magnetic path. Plunger (Fig. 11, item 2) is pulled inward and pulls connecting link (Fig. 11, item 3), which is connected through linkage to the throttle valve (Fig. 16, item 6). Thus, as the generator load increases, the throttle is opened, speeding up the engine, and maintaining a constant a-c voltage.

10. IGNITION SYSTEM.

a. **Magneto.**—The ignition is supplied by a high tension magneto (Fig. 17) equipped with an impluse spring coupling to facilitate starting at low cranking speeds.

b. This magneto consists, fundamentally, of a source of flux—a magnetic rotor (Fig. 17, item 1), a primary coil (Fig. 17, item 2) in series with a contact (Fig. 17, item 8) which is shunted by a condenser, a secondary winding over the primary, and an impulse coupling mechanism (Fig. 17, items 4, 5, 6, 7, 8, 9, 10, 11).

c. The magnet simply provides a magnetic field which is carried through the iron core to the primary winding. This field is established and then broken or reversed by the rotation of the rotor and it is the energy put into the magneto by this mechanical means which ultimately shows up at the spark plug. The change in value of the magnetic field throughout the iron core in the primary coil induces a flow of electrical energy in the coil. The total value of this energy is dependent on how strong the magnetic field is, how rapidly its intensity through the iron core is changed and on the length and cross section of the magnetic circuit. The magnetic field is actually reversed through the coil, thus changing the intensity of the field from full strength in one direction to full strength in the other direction.

d. The spark producing cycle begins when the pole shoes of the magnet are completely covered by the shoes of the iron path, thus carrying the flux full strength through the coil. Under this condition, the contacts are closed, completing the primary circuit. Since there is no change of flux value under this condition there is no current flowing in the primary circuit. The change in value of the magnetic field throughout the iron core in the primary coil induces a flow of electrical energy in the coil. As the rotor or magnet begins to rotate, the poles begin to be uncovered, thus decreasing the cross section of the iron path and reducing the density of the magnetic field. This causes a current to flow in the primary coil. Further rotation of the rotor brings it to a point where the primary current reaches the highest value it can obtain and the primary circuit is then opened. This opening of the circuit reduces the current to zero. During the interval, prior to the opening of the primary circuit, the changing of the flux value has been resisted or choked by the closed primary circuit. There has not been as much of a change as there would have been if no coil were present around the magnetic circuit. When the contacts are opened by the action of the cam and the flux choke removed, there is a rapid change in flux in order to allow it to catch up with where it would normally be without the closed primary. The primary current having been reduced to zero and the flux allowed to follow its normal

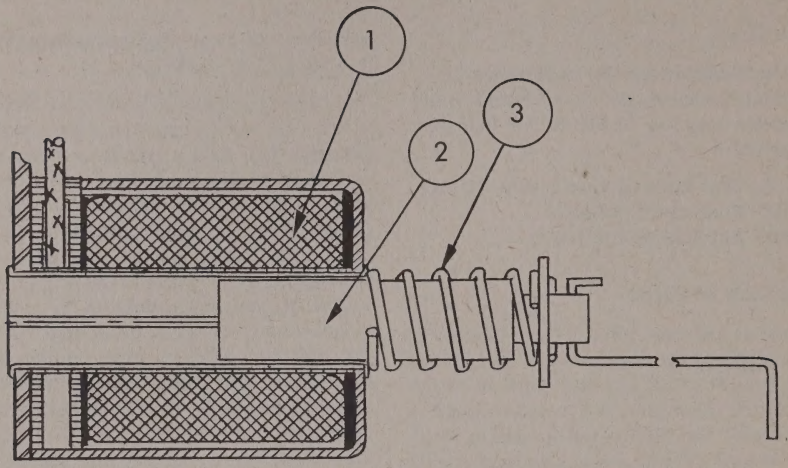

FIG. 10—AUTOMATIC CHOKE

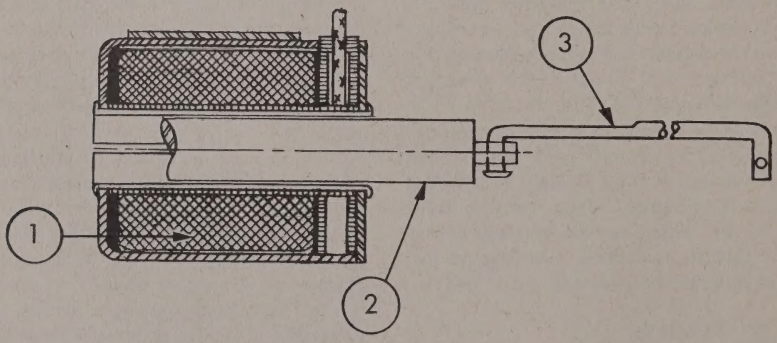

FIG. 11—MAGNETIC GOVERNOR

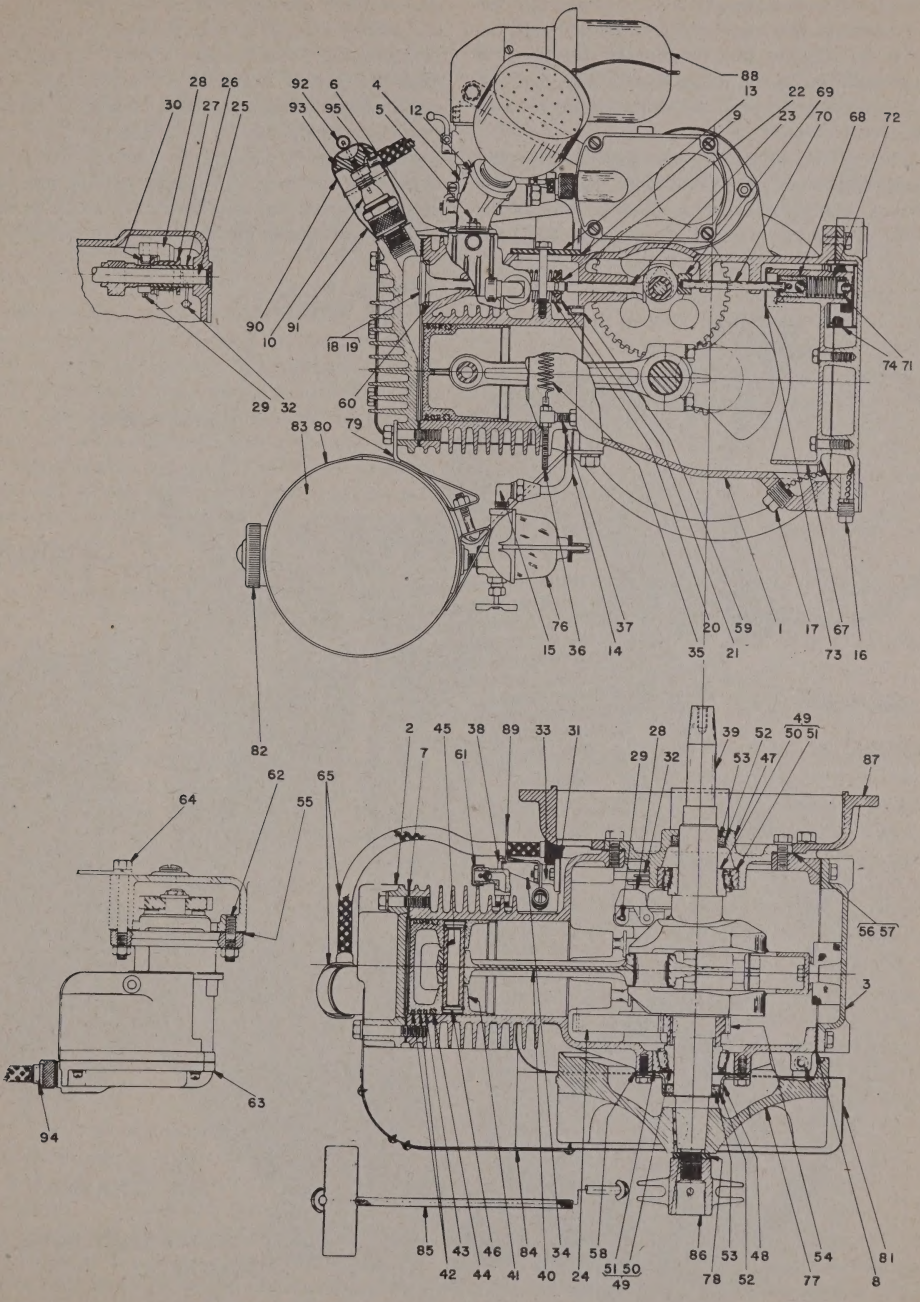

FIG. 12—THE ENGINE
CROSS SECTIONAL VIEW

trend, the rotor continues to turn until one-quarter revolution has been completed from its original starting point. The flux is now completely and fully established in the opposite direction and the contacts are again closed and the cycle is ready to be repeated.

e. During all the action just described in the primary coil, another coil of wire, having from sixty to ninety times as many turns of wire as the primary and wound around the primary has been idle until the primary circuit was opened. It is the secondary coil and is in series with the spark plug in the engine. Since the resistance of this gap is very high, no current can flow in the coil until a sufficiently high voltage has been created to allow the resistance of the gap to be overcome. Throughout the first stages of the primary current rise, the flux change is also causing a slight voltage rise in the secondary coil, but it is much too small to bridge the spark plug gap, particularly at low rotor speeds.

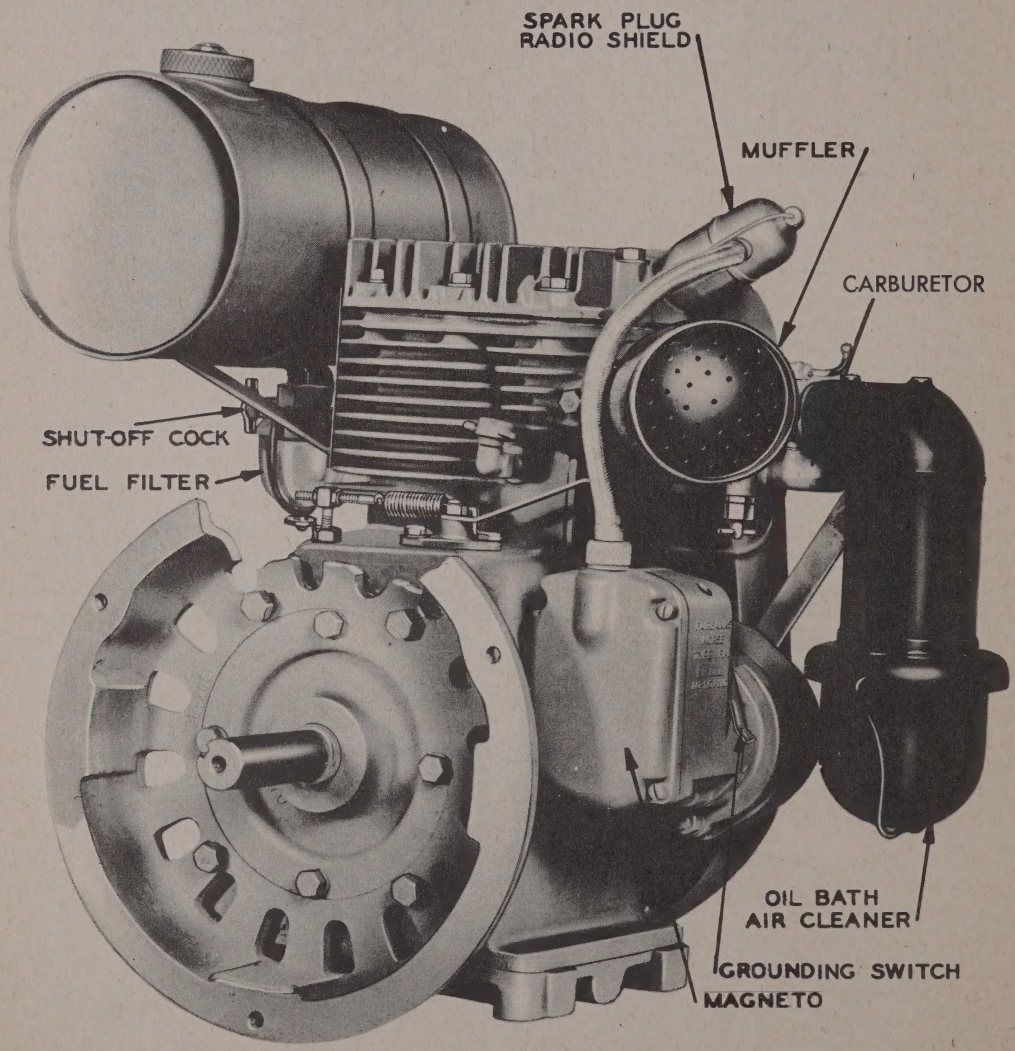

FIG. 13—THE ENGINE—REAR VIEW

However, as the primary circuit is broken, this rapid reduction of the primary current and increase of primary voltage causes a strong electro-magnetic field to be created. This field induces a high voltage in the secondary coil raising it to the point where it will overcome the resistance of the spark gap and cause a current in the form of a spark to flow. This induction between the primary and secondary coils is further aided by the flow of current out of the condenser through the primary and by the sudden rapid change of flux when released by the primary coil.

f. The rapidity of rise of the secondary voltage is slowed down by the leakage in the secondary system as explained before. The insulation of the coil, the distributor, the lead wires and the spark plugs all leak away a certain amount of energy. The rate of rise of the secondary is speeded up by the condenser discharging back through the primary and also the change of the magnetic field released by the opening of the primary circuit. Once the voltage has risen to the breakdown voltage of the gap it will go no higher and actually drops considerably since the resistance of the gap decreases as soon as a flow of current has been started. The secondary system then continues to discharge itself until there is insufficient energy to maintain the flow across the gap. It then becomes open circuited again and is ready for the next cycle.

g. The impulse coupling mechanism consists of a drive shaft coupled to the rotor by a spring assembly; (Fig. 17, item 6) a coupling pawl (Fig. 17, item 7) fastened to a support plate assembly which, in turn is fastened to the end plate which not only provides for the mounting of the magneto to the engine but also furnishes a bearing for the drive shaft and contains the impulse stop pin. Fastened to the end of the drive shaft is a cam plate (Fig. 17, item 11) which contains, as does the support plate, a pin. The impulse spring unit is assembled so that one end of the spring unit is over a pin in the cam plate and the other end over a pin in the support plate.

(1) The impulse mechanism operates as follows: As the engine is cranked, the drive shaft, which is geared to the engine, rotates, but the trip arm, because of its weight, hangs in a vertical position and rests against the impulse stop pin, thus preventing the rotor from turning. As the drive shaft continues to rotate, the impulse spring is compressed. At the same time, however, the cam plate is also rotating, tending to push the coupling pawl free from the impulse stop. As the drive shaft continues to rotate, the spring is further compressed and the cam plate continues to push the coupling pawl out. As the spring nears complete compression, the cam plate pushes the coupling pawl free of the impulse stop and the energy stored in the spring snaps the rotor around at high speed at just the right moment to produce a powerful spark, thus starting the engine.

(2) During starting of the engine, the coupling pawl engages the pawl stop pin once per revolution in order to provide the impulse action which intensifies the ignition spark. The functioning of the coupling can be checked by turning the drive gear by hand in a clockwise direction and noting the engagement, windup and release of the coupling. The impulse feature continues to function until a rotative speed of between 190-210 rpm has been reached, after which centrifugal force causes the pawl end to retract with the result that no engagement with the stop pin occurs and the coupling serves as a solid drive member.

h. Spark Plug.—The ignition current is supplied to the spark plug (Fig. 12, item 10) through the high tension shielded wire (Fig. 12, item 65) from the magneto (Fig. 17).

11. STARTING.

a. When the START button is pressed, either in the remote control circuit (figure 9) or at the control box (PE-108-E only) (figure 8) it closes the circuit from the battery to the exciter winding of the generator through a 12-volt start solenoid (figure 6, item RY5). This solenoid is used because of the heavy current drawn. The heavy contacts of the relay can move adequately to carry the load.

b. Stopping.—When the STOP button is pressed, this grounds out the primary circuit of the magneto so that no ignition current reaches the spark plugs. Hold the STOP button down until the engine has completely stopped. The power unit can also be stopped from a remote control station at Radio Set SCR-453-(*) or one otherwise located (figure 9).

12. GENERATOR.

a. General.—The generator (figure 14) consists of a 4-pole rotating armature type alternator with double winding, a 12-volt exciter winding which also supplies the current for the starting battery, and a 110-volt a-c winding. Mechanically

both alternator and exciter are built into one unit. The generator develops 600 watts of 110-volt, 60-cycle, single-phase, alternating current at 1800 rpm.

b. Voltage Regulation.—Voltage regulation is obtained by inherent characteristics of the magnetic circuit of both alternator and exciter, as well as by a magnetic speed regulator which operates in conjunction with the mechanical engine governor. This arrangement permits good voltage regulation at no great sacrifice to efficiency and heat rise.

c. Alternator..—The alternator is that part of the generator which supplies the 110-volt alternating current for use at the main lines. It consists of two parts—a rotor and a stator.

(1) The stator (the stationary windings and magnetically active iron in an electrical machine) is in the generator frame and is the field. Leads are brought from the slip rings (figure 14) to the a-c terminals on the control box.

(2) The revolving part which includes the d-c and a-c windings on the same shaft is the armature. It receives excitation from the shunt winding of the field. This rotor is directly mounted and bolted to the crankshaft of the gasoline engine. Both operate at the same speed—1800 rpm. As the engine is governed at this speed, and this varies but slightly according to the load, the generator frequency is well regulated. For this power unit the overall voltage regulation is 7%. That means that at full load the voltage is 110 volts and at no load, it is 120 volts—an addition of 7% over the full load voltage.

(3) The main 110-volt a-c wires from the slip rings (figure 14) of the armature are connected to the devices in the control box (figure 6) and finally terminate in the a-c receptacle on the control box.

d. Meter Readings.—After starting the power unit, the voltmeter will register between 110 volts and 120 volts depending on the size of the load. The ammeter (PE-108-D and E only) will only register if there is a connected load. The circuit breaker is both a disconnect switch and overload protection

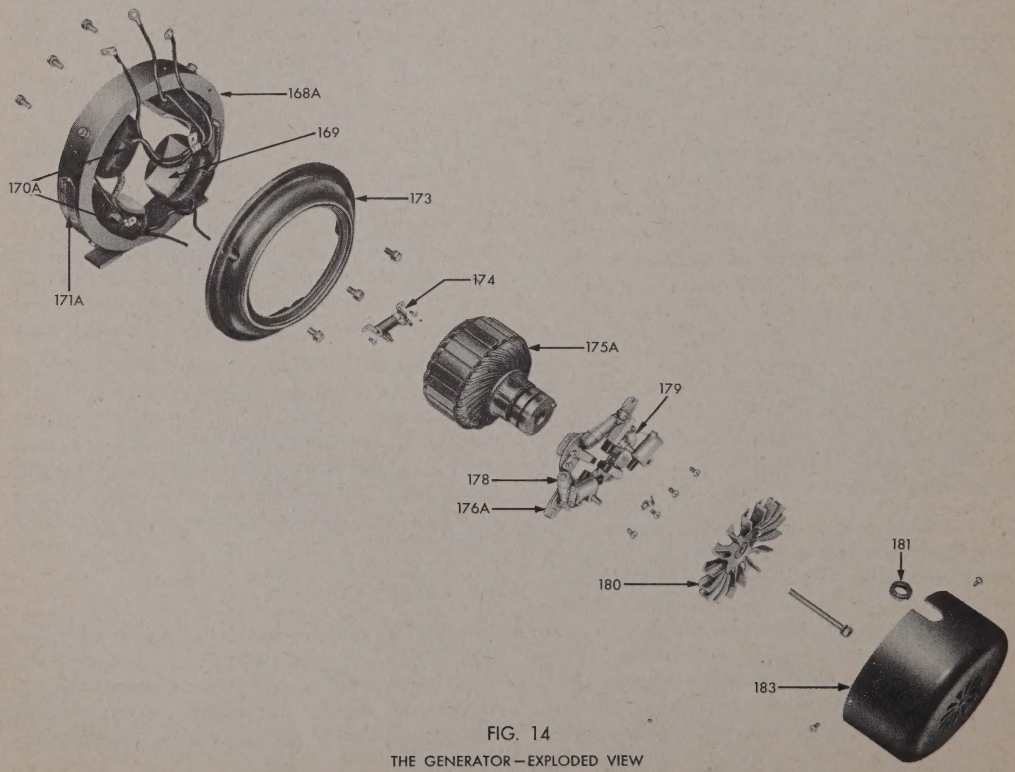

FIG. 14
THE GENERATOR—EXPLODED VIEW

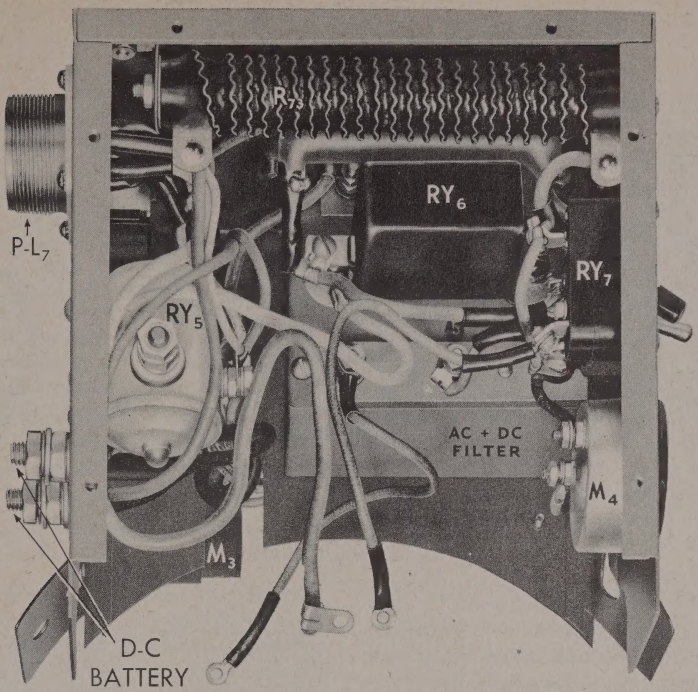

FIG. 15 – THE CONTROL BOX– PE-108 E –INTERIOR VIEW

PARTS ILLUSTRATED

1. Choke Valve
2. Idle Air Bleeder
3. Main Discharge Jet
4. Idle Needle Valve
5. Idle Discharge Hole
6. Throttle Valve
7. Float Chamber Vent
8. Float Fulcrum Pin Clip
9. Float Needle Valve
10. Float Fulcrum Pin
11. Float Needle Valve Seat
12. Float Seat Gasket
13. Fuel Inlet
14. Fuel Strainer
15. Fuel Strainer Plug
16. Float Lever
17. Float
18. High Speed Needle Valve
19. High Speed Air Bleeder

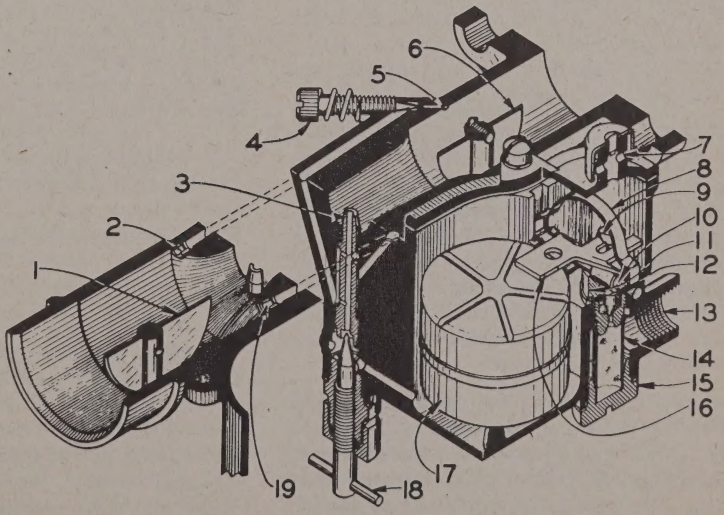

FIG. 16—THE CARBURETOR

PE-108-(*)

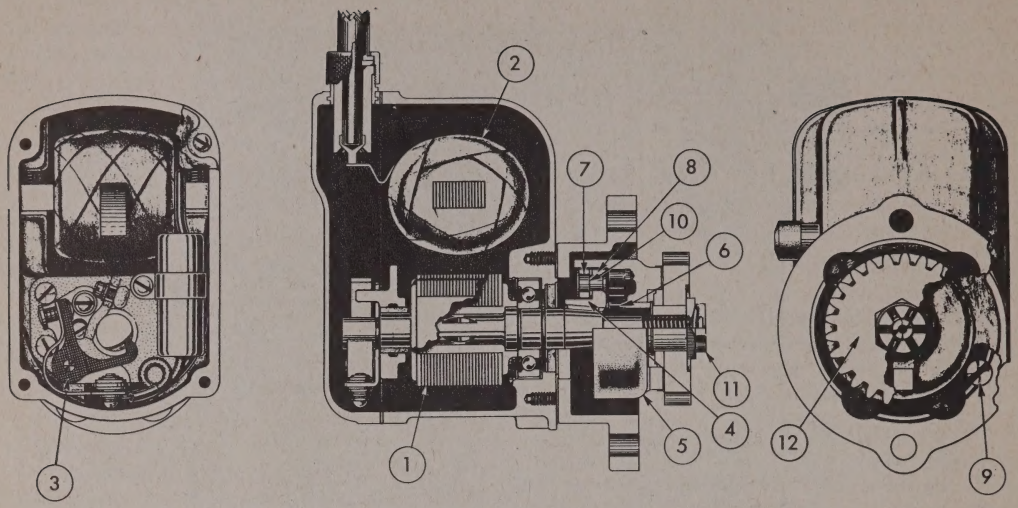

FIG. 17—THE MAGNETO

device.

e. STARTING CIRCUIT. — When the START button (figures 9 and 15) on the control box or remote control station is pressed, the starting relay (Figs. 5, 6, 15, item RY5) is closed and stays closed as long as the START button contact is made. Closing of this relay completes the circuit between the starting batteries and the exciter. This energizes the exciter which now acts as a motor, the power of which is transmitted to the engine and cranks it. Cranking continues as long as the START button contact is made and the batteries can furnish electrical power.

f. EXCITATION TO ALTERNATOR.— After the plant has started the exciter fullfils its designed function of furnishing excitation to the alternator. This excitation increases the efficiency and output of the alternator. Impressing a voltage on the wires of the electromagnets in the alternator armature increases the magnetic flux. The larger the flux, the greater is the number of lines of force that can be cut by the armature and so the output of the generator is increased.

g. D-C SUPPLY TO BATTERY AND OUTPUT.—The exciter also serves as a source of power for charging the starting batteries and for feeding a 12-volt d-c circuit when the power unit is running. This circuit is terminated in the d-c receptacle (Fig. 7, item PL7) on the control box. The d-c generated when the plant is running feeds through two relays when charging the starting batteries. The positive wire from the generator is connected to the start relay since that is the point from which heavy current is drawn for starting purposes. From there a wire is connected to the coil of the charge relay (Figs. 5, 6, 15, item RY6). As the other side of the coil is grounded, as soon as the exciter does generate a current, the coil becomes an electromagnet, pulling down a contact arm. This contact arm is in the circuit between the battery and the exciter. The function of this charge relay is to prevent a discharge of the batteries when no current is being generated either because of plant idleness or trouble in the charging circuit.

h. When the plant is not running the starting batteries act as the source of power for the d-c circuit. Connection is made at the positive wire which comes from the battery to the starting relay (Figs. 5, 6, 15, item RY5) on the control box. A wire feeds from there to the d-c receptacle (Figs. 5, 6, 9, 15, item PL7) on the control panel.

i. When the plant is running the d-c receptacle (Figs. 5, 6, 8, 15, item PL7) not only is supplied current from the batteries but also from the generation of the exciter. In that case, the batteries "float the line," absorbing the higher voltage so that the voltage at the d-c receptacle is 12 volts. If the current drawn from this receptacle is greater than that supplied from the exciter, the balance is taken from the batteries.

SECTION IV
Maintenance

13. THE ENGINE.—a. Fuel.—The fuel recommended is a non-leaded gasoline of an octane rating of at least 67.

b. Addition of Oil.—A new engine should not require the addition of oil during an 8 hour working day. It is, however, advisable to check oil level each shut down period, such as at noon or every 5 hours of operation and see that this level is maintained. The base of the engine holds approximately one quart of oil and it should be filled level with the filler hole. Oil should be added to maintain this level.

c. Changing of Oil.—The old oil should be drained and fresh oil added after every 48 hours of operation.

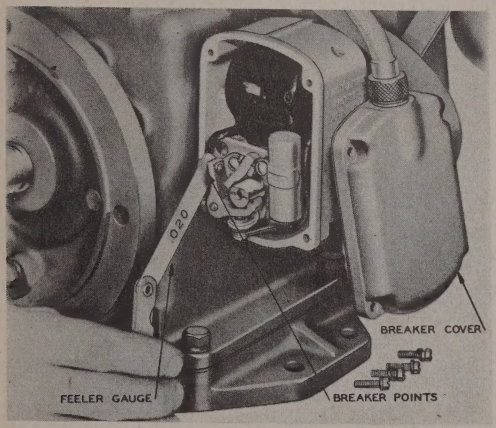

FIG. 18—CHECKING MAGNETO POINT CLEARANCE

d. Check for Spark.—To prove that a satisfactory spark is being obtained from the magneto remove shield and the ignition cable from the spark plug. Hold the ignition cable terminal about ⅛ in. from cap of the shield and the cap on any metal part of the engine. Turn motor with starting rope, and if a spark jumps this gap, the entire ignition system with the exception of the spark plug is all right (See Fig. 19).

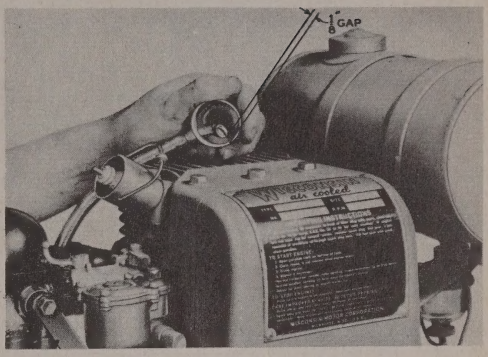

FIG. 19—CHECKING FOR SPARK

e. Changing Spark Plug.—Spark plug life on a gasoline engine, depends on the type of service and kind of fuel used. Clean the spark plug after every 200 hours of operation and reset the points to .025 inch. Dissolve all carbon and gum deposits with solvent P-S-661A. The points should be adjusted as shown in Fig. 20.

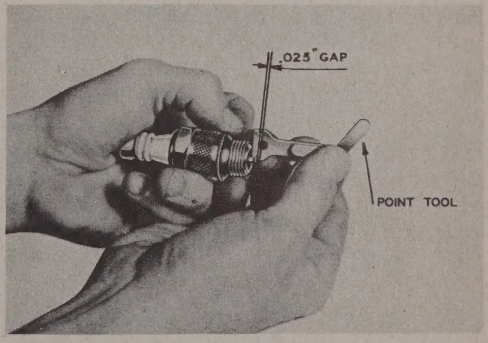

FIG. 20—SETTING SPARK PLUG POINTS

f. Servicing Fuel Strainer.—The fuel strainer filters the gasoline before it enters the carburetor. A visual inspection should be made daily and if dirt is present in the cup, it should be emptied and the cup thoroughly cleaned (See figure 21).

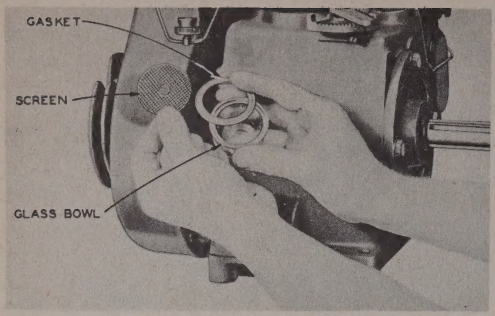

FIG. 21—SERVICING FUEL STRAINER

g. Servicing Air Filter.—PE-108-A , B , C is equipped with a screen type air cleaner whose function is to clean the air before it enters the carburetor to mix with the gasoline. Clean the air filter by removing it from the carburetor and swishing it in Diesel oil. Drain the Diesel oil and soak the filter in light lubricating oil. Use the same oil as used in the engine crankcase.

(1) PE-108-D , E is equipped with an oil bath air cleaner. To service remove the cup at the bottom of the air cleaner and empty out the oil together with the dust collected at the bottom of the cup. Clean the cup and refill to the level as shown on the cup, with the same grade of oil as used in the engine crankcase (See figure 22).

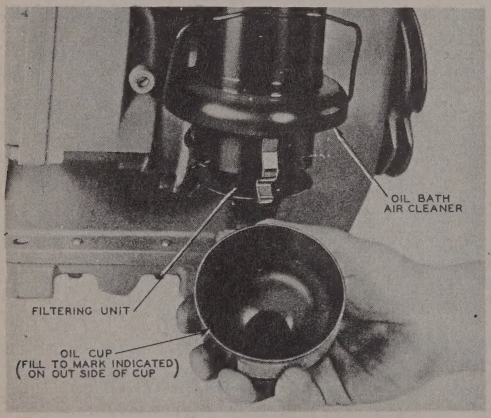

FIG. 22—SERVICING AIR CLEANER

(2) Clean the filtering unit of the oil bath air cleaner daily or more often if necessary. This filtering unit consists of fine mesh wire which will prevent large pieces of dust or dirt from entering the carburetor. To clean, remove the three screws which hold the air cleaner to the bracket and pull the body of the filter free of the bracket. Clean the element thoroughly in Diesel oil or solvent and reassemble.

DO NOT REMOVE FILTERING UNIT FROM AIR CLEANER

(3) The air cleaners should be cleaned after each day of engine operation and in extreme dusty conditions it is necessary to clean two or even three times a day.

14. ENGINE DISASSEMBLY.—

a. Removal of Starting Rope Sheave. —The rope starter sheave can be removed from the crankshaft by unthreading it in a counter-clockwise direction. This is facilitated by the use of a common monkey-wrench.

b. Removal of Shroud and Fuel Tank.—Remove the 4 capscrews and plain washers, which hold the shroud and cylinder head to the cylinder. Next loosen and remove the two round head screws and lockwashers which hold shroud to engine base. Loosen the fuel line at the fuel strainer below the tank. The assembly of the fuel tank and shroud may now be removed as a unit (See figure 23). If it is desired to remove the fuel tank from the shroud, remove the two bolts and nuts holding the fuel tank bracket to the shroud.

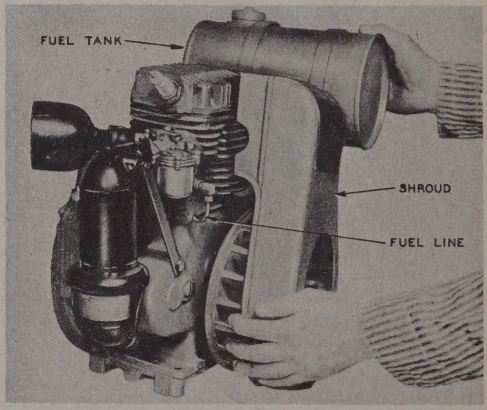

FIG. 23—REMOVAL OF SHROUD AND FUEL TANK

c. Removal of Flywheel.—The flywheel fits on a taper on the crankshaft and is easily removable. After the shroud and the fuel tank have been removed grasp the flywheel with the left hand. Place a block of wood against the end of the crankshaft. Strike the block several sharp blows with a hammer and the flywheel should then slide off the taper (See figure 24).

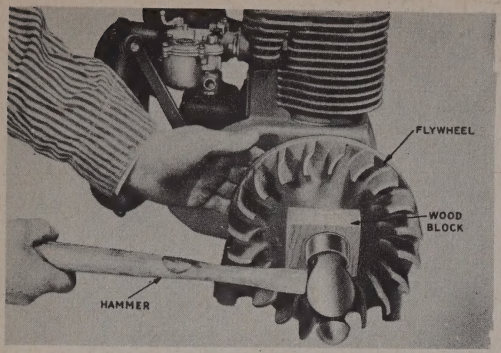

FIG. 24—REMOVAL OF FLYWHEEL

d. Removal of Cylinder Head.—Disconnect the spark plug wire and remove the spark plug. Loosen and remove the 4 cap screws and washers, which hold the head in place. Lift off head and gasket.

e. Removal of Carburetor and Air Cleaner.—Loosen the control rod from the carburetor to the governor control lever by removing the cotter pin which secures the control rod to the control lever. Leave the control rod threaded into the carburetor. Loosen and remove the two nuts which hold the carburetor to the cylinder. The assembly of the carburetor and air cleaner can then be removed (See figure 25). If it is desired to remove the air cleaner from the carburetor, loosen the clamp screw on the air cleaner and pull the air cleaner off the carburetor.

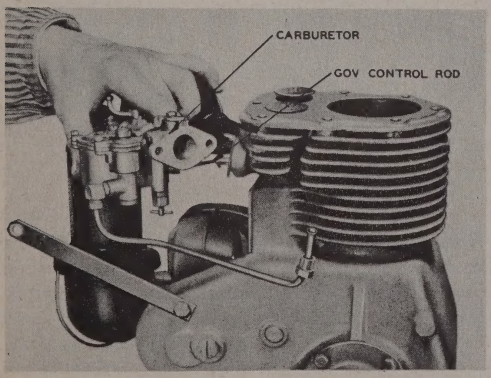

FIG. 25—REMOVAL OF CARBURETOR

f. Removal of Magneto.—Loosen the knurled nut which fastens the shielding to the magneto and pull the wire and shield off the magneto. Next loosen and remove the upper cap screw, nut and lockwasher and also the lower nut and lockwasher. The magneto assembly can then be pulled off the engine (See figure 26).

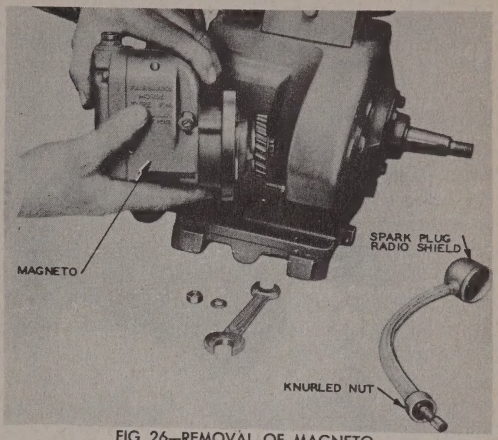

FIG. 26—REMOVAL OF MAGNETO

g. Changing Magneto.—If a magneto is replaced, caution must be taken so that the new magneto is properly timed to the engine. The magneto must be assembled to the engine so that the magneto gear is in time with the camshaft gear. The gears are marked with a chisel mark and these marks must coincide to have the gears in time. In order to line up these timing marks, a peep hole is provided in the crankcase. (See figure 27). The crankshaft should be turned until the chisel mark on the camshaft gear is visible through the peep hole. The magneto should then be assembled so that

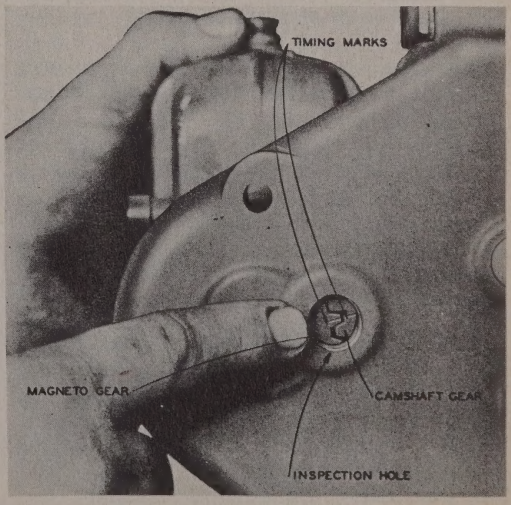

FIG. 27—MAGNETO TIMING

the mark on the magneto gear is in line with the mark on the camshaft gear. The bolts, lockwashers, and nuts should then be replaced and securely tightened.

h. Removal of Muffler.—To remove muffler unscrew it from the street ell which is screwed into the cylinder. To remove the street ell, loosen the cap screw which locks it and unscrew.

i. Removal of Valves.—Remove the cylinder head. Remove the capscrew and washer which holds the inspection plate to the engine. The plate can then be pried away from the cylinder which will expose the valve spring keepers and locks. A standard adjustable type valve lifter should be used and the valve springs compressed. This will expose the retainer locks which can be pried away from the valve stems with a screw driver (See figure 28). The springs should then be removed with the valve spring seats, and the valve pulled upward out of the guide.

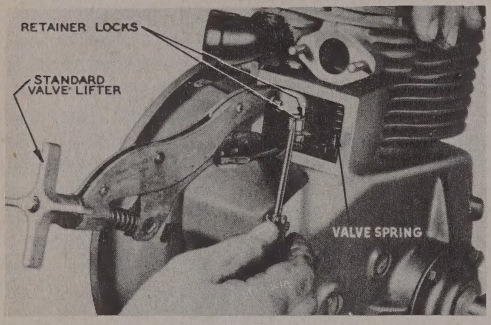

FIG. 28—REMOVAL OF VALVES

j. Removal of Engine Base.—**NOTE: Be Sure to Drain the Oil Out of the Engine Base Before Attempting to Remove the Base.**—To remove the engine base, first remove the generator adaptor housing by removing the 4 cap screws and lockwashers which hold the adaptor to the crankcase. Tap the adaptor with a babbitt hammer or wood block away from the case. Remove the ten capscrews and washers and lift the base off the crankcase. (See figure 29).

k. Removal of Connecting Rod and Piston Assembly.—Loosen and remove the two capscrews and lockwashers on the connecting rod cap and remove the cap. Tap the rod gently with a hammer handle to drive the piston out of the bore. As soon as the piston protrudes over the edge of the cylinder, grasp it firmly and withdraw it from the bore.

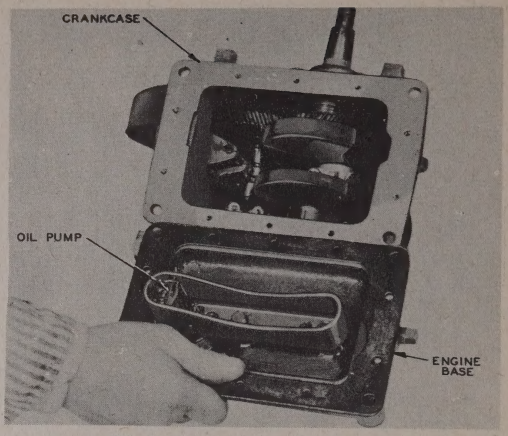

FIG. 29—REMOVAL OF ENGINE BASE

l. Removal of Crankshaft.—Loosen and remove the four capscrews and lockwashers which hold the main bearing plate to the crankcase and pull off the plate (See figure 30). Pull the crankshaft assembly out of the case. When removing the crankshaft, protect the bearings with the hand so that they are not bumped or scratched.

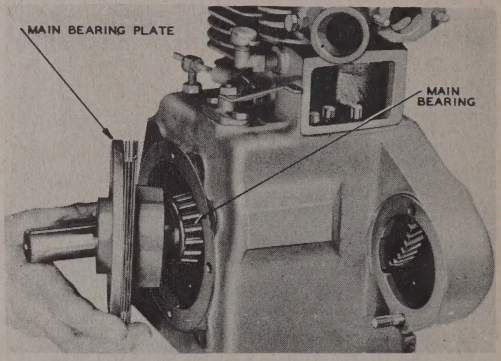

FIG. 30—REMOVAL OF MAIN BEARING PLATE

m. Removal of Governor Control Lever and Governor Spring.—Remove the governor spring by detaching from the governor lever and adjusting screw. Remove the nut which holds the governor lever to the shaft. Pry the lever off the shaft. Loosen and remove the 2 capscrews which hold the governor shaft support bracket to the case. Withdraw the bracket and shaft from the case.

n. Removal of Camshaft.—Remove the welch plug on the take-off end of the engine by driving a sharp pointed tool into it and wedging it out of boss (See figure 31). Use a drift punch and drive out

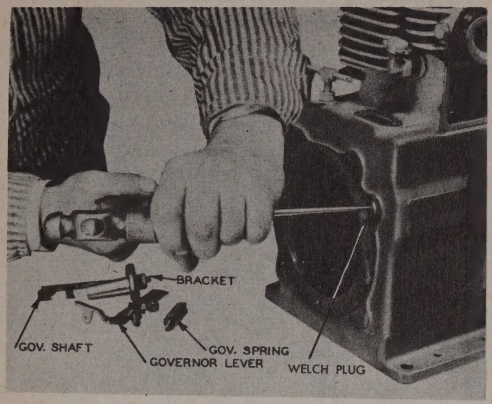

FIG. 31—REMOVAL OF CAMSHAFT

camshaft support pin. The entire camshaft assembly with the weights assembled can then be removed from the bottom of the crankcase (See figure 31A).

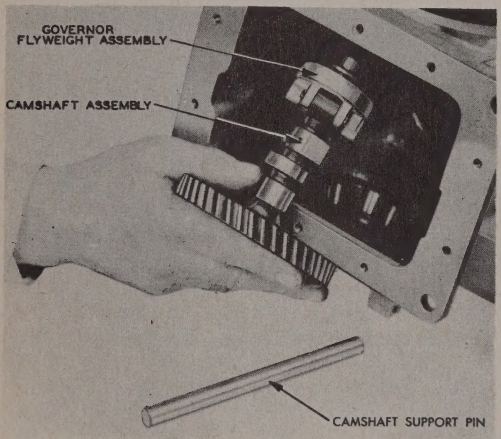

FIG. 31A—REMOVAL OF CAMSHAFT

o. Disassembly of Governor Weights.—Spread the weights outward away from the shaft and pull the thrust sleeve and spacer off the shaft. Remove the cotter pins which lock the fulcrum pin in place and drive out the fulcrum pin.

p. Removal of Oil Pump Plunger Push Rod.—Grasp the plunger push rod firmly with a pair of pliers. Drive the head of the push rod off and withdraw the push rod from the guide. The valve tappets can now also be pulled out of the guides.

q. Disassembly of Oil Pump.—Remove the cover which holds the plunger on the bore and retains the oil in the trough by removing the two screws which hold it in place. Hold a screw driver against the plunger to prevent its popping out as the cover is removed. Lift the plunger and spring out of the cylinder bore. Turn over the oil pump body and the retainer and check ball will fall out of the cylinder bore. The oil pump body can be removed from the base by removing the 2 capscrews and washers which hold it in place.

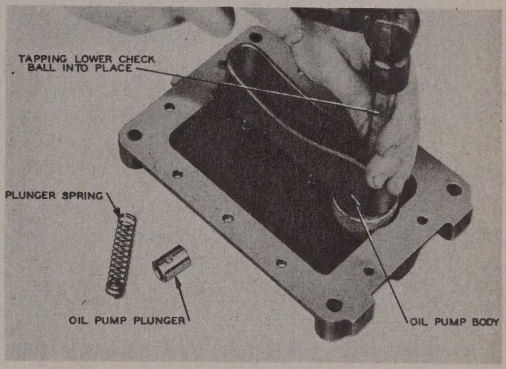

FIG. 32—REASSEMBLY OF OIL PUMP

15. REASSEMBLY OF ENGINE.

a. Reassembly of Oil Pump.—Wash all parts of the pump in Diesel oil or solvent. Fit the oil pump plunger to the bore with a clearance of .0035″ to .006″. If the clearance is greater than .010″ replace the plunger and oil pump body. Inspect the check ball seat in the bottom of the pump cylinder. This seat must be perfectly clean, not lined or pitted. Drop the check ball into the cylinder and tap into the seat lightly with a punch and hammer (See figure 32). Put the retainer in place and lower the spring into the cylinder bore. Place the other check ball in the plunger and tap lightly into the seat. Then drive the retaining pin into place. Be sure to clean up any burr on the plunger which might be caused by driving the retaining pin in place. The burrs can be removed with a fine file. Insert the plunger in the cylinder and hold it in place with a screwdriver until the retainer cover is replaced. Next fill the base with about ½ pint of oil. Pump the piston up and down with a screwdriver to draw oil into the trough. (See figure 33) If no oil is discharged into the trough, the body and plunger are worn and should be replaced.

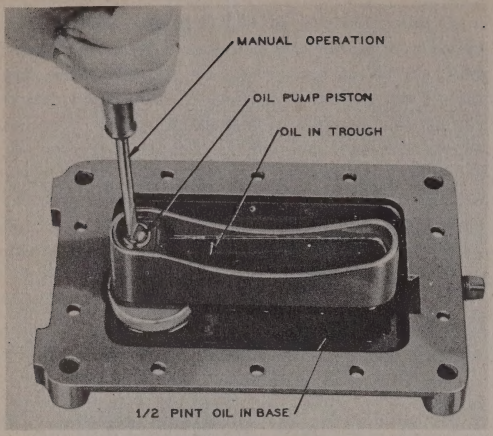

FIG. 33—PRIMING OIL PUMP

b. Reassembly of Oil Pump Push Rod.—Insert the push rod into the guide and hold the cap in place. Use a hammer and drive the rod into the cap. Now replace the valve tappets in the guide. The proper clearance for the tappets is .002″ to .004″.

c. Reassembly of Governor Weights.—Hold the weights in position, drive the fulcrum pin in place and secure it with cotter pins. Place the thrust sleeve over the spacer and assemble to the camshaft so that the thrust pins on the weights bear on the flange of the thrust sleeve. If excessive play or looseness is noted in the fit of the weights and fulcrum pins, replace both parts.

d. Reassembly of Camshaft.—Drive the camshaft support pin in place to hold the camshaft, governor weights and thrust sleeve in position in the crankcase. The camshaft is fitted to the support pin with a clearance of .002″ to .003″. The camshaft should have an end clearance of .002″ to .013″. Use new welch plugs to seal the crankcase camshaft support pin holes.

e. Reassembly of Governor Control Lever and Governor Shaft.—Install the governor shaft and support bracket so that the yoke is behind the governor sleeve. This is accomplished by pushing the thrust sleeve as far as possible toward the flywheel end of the engine before inserting the yoke and shaft assembly. Bolt the bracket to the case with the two capscrews provided, mount the control lever and tighten it in place. Replace the spring by hooking into the governor lever and the adjusting screw.

f. Reassembly of Crankshaft.—Insert the crankshaft into the crankcase and replace the main bearing plate. The main bearing plate is fitted with shims to allow clearance for the main bearings. This clearance should be .002″ to .004″ with the engine cold.

Take care, when meshing the crankshaft gear with the camshaft gear, that the timing marks line up. The crankshaft gear is marked with a punch mark on one of the teeth. This mark must be placed between the two punch marks on the camshaft gear (See timing diagram figure 34).

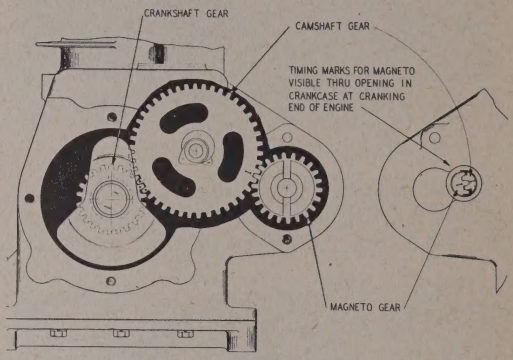
CRANKSHAFT GEAR
CAMSHAFT GEAR
TIMING MARKS FOR MAGNETO VISIBLE THRU OPENING IN CRANKCASE AT CRANKING END OF ENGINE
MAGNETO GEAR

FIG. 34—TIMING DIAGRAM

g. Reassembly of Piston and Connecting Rod.—Assemble the piston to the connecting rod with a clearance of .0002″ to .0003″ between the piston pin and connecting rod. The piston pin is a light press fit into the piston bosses and an oversize pin should be used if the pin is loose. Install the piston rings on the piston with the oil ring in the lower groove, scraper in the second groove and compression rings in the top grooves (See figure 35).

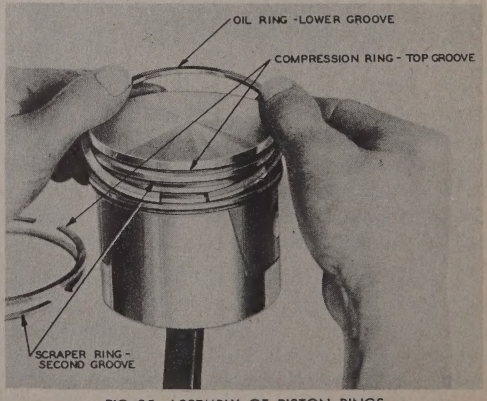

FIG. 35—ASSEMBLY OF PISTON RINGS

The rings are fitted with a gap clearance of .012″, and a side clearance in the ring grooves of .002″ to .003″. The piston is fitted to the cylinder with a clearance of .0055″ to .006″ measured on the skirt of the piston. To reassemble, lower piston and rod assembly into the cylinder until the expanded rings contact the top of the cylinder. Use a ring compressor made from a piece of band iron to compress the rings into the grooves of the piston. Using the handle of a hammer, tap the piston gently into the cylinder (See figure 36). The cap and the top part of the connecting rod have a mark and these marks must be on the same side. The oil hole in the lower part of the connecting rod should face the carburetor side of the engine. Fit the rod to the crankshaft with a bearing clearance of .001″ to .002″ and a side clearance of .006″ to .010″.

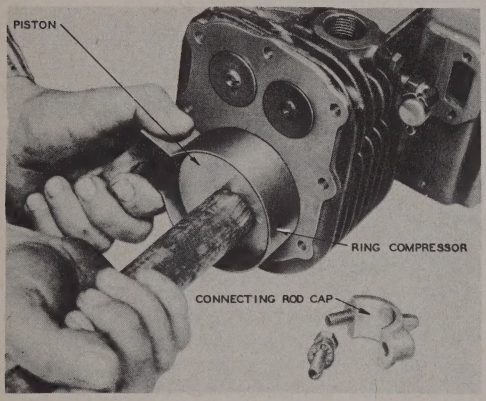

Fig. 36—ASSEMBLY OF PISTON AND ROD

h. Reassembly and Grinding of Valves.—(1) Inspect the seat in the cylinder block. If it shows signs of pitting or burning, replace or regrind. If regrinding is necessary, use a standard automotive type valve seat insert grinder. The seat angle is 45°. Clean and scrape the valves free of carbon. If the seat of the valve shows signs of burning or pitting, replace it. The valves are now ready to be ground. Put a small amount of medium grade grinding compound on the seat of the valve. Place a small spring on the stem of the valve and place the valve in the guide. Use a screwdriver to twirl the valve back and forth while applying pressure downward, occasionally allow the pressure of the spring to lift the valve away from the seat in the cylinder. This allows the grinding compound to stay on the surface of the valve seat (See figure 37). Be sure that an entire circle or two of the valve is made in grinding

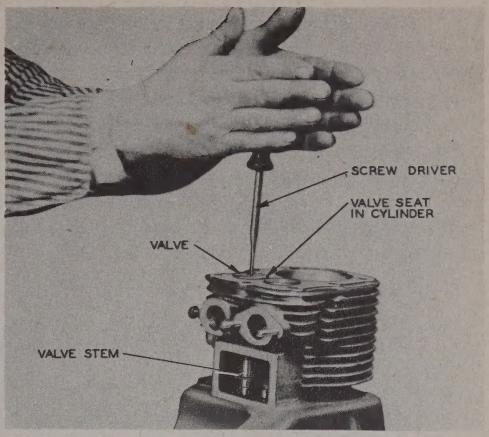

FIG. 37—REASSEMBLY AND GRINDING OF VALVES

as well as a back and forth motion. Inspect the valve seat at intervals. A properly ground valve is indicated by a dull gray ring completely around the seat of the valve. The actual width of this seat should be about $\frac{3}{32}$″. After grinding, wash the seats and valves in Diesel oil to remove all traces of grinding compound. Any small amount of compound left on the valve stems would result in rapid wear of the valve stem and guide. The clearance in the guide should be .003″ to .005″.

(2) Place the valves in the guides and check for clearance. Turn the crankshaft until the valve tappet is at the bottom of its stroke and then continue turning about $\frac{1}{4}$ turn. This is to make sure the tappet is not riding the cam, which would give a false reading. Insert a feeler gauge between the tappet and valve (See figure 38). The proper clearance is .010″ to .016″; if the clearance is less than .010″, remove the valve and grind off bottom of the valve stem to obtain this clearance.

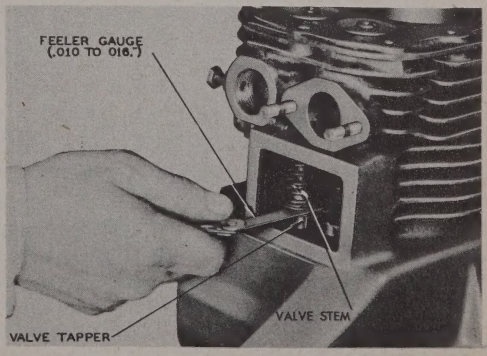

FIG. 38—CHECKING VALVE TAPPET CLEARANCE

(3) When reassembling the valves to the cylinder, hold the spring in place so that the stem of the valve is in the center of the spring. Slip the valve spring seat over the end of the valve under the spring and use a valve lifter to compress the spring and seat. Use a sticky grease to coat the retainer locks and they can then be easily inserted with the help of a screwdriver (See figure 39). The small end of the retainer lock should be up. Lower the spring and seat over the retainers.

Use a new gasket in replacing the tappet plate.

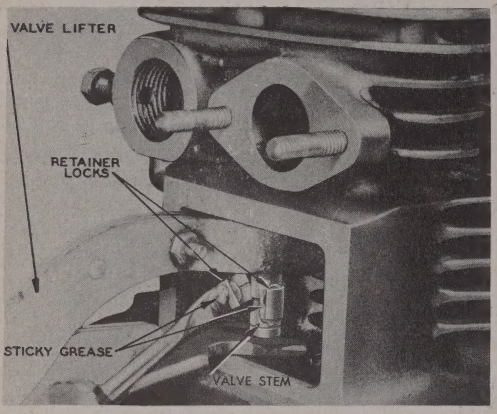

FIG. 39—ASSEMBLY OF VALVES

i. Reassembly of Engine Base.—Use a new gasket and assemble the engine base to the crankcase so that the oil pump push rod seats in the oil pump plunger. Replace the bolts and tighten alternately.

j. Reassembly of Carburetor and Air Filter.—(1) Use a new gasket, place the carburetor over the two studs on the cylinder, and tighten in place with the nuts provided. Adjust the governor control rod, which threads into a pivot on the carburetor, to give proper governor regulation. The governor control lever has just sufficient travel to give the full travel of the carburetor throttle.

(2) Hold the throttle on the carburetor in a wide open position. Hold the control lever as far as possible toward the carburetor, thread the control rod into the swivel on the carburetor to a point where the bent end lines up perfectly with the hole in the governor control lever. If assembled in this manner, the governor lever will give the full throw of the carburetor throttle. Attach the air cleaner to the carburetor by sliding over the air horn and tightening the clamp screw.

k. Reassembly of Cylinder Head.—Scrape the cylinder head clean of any carbon deposit and wash in Diesel oil. Use a stiff wire brush and brush the cooling fins free of all dust and dirt. Brush all dirt from between the fins on the cylinder. Scrape all carbon deposits from the top of the cylinder and be sure that the portion of the cylinder and cylinder head which contact the cylinder head gasket be absolutely clean and flat. Do not scratch the surface when scraping carbon deposits. Use a new cylinder head gasket and place on the cylinder with the flange side of the gasket up. Place the cylinder head over the gasket and replace the four capscrews and washers nearest the take off end of the engine. Draw down these four bolts loosely. Do not replace the four capscrews and washers which hold the shroud and fuel tank strap.

CAUTION.

Special care must be taken that the proper length capscrews are used. Some of the capscrews are longer—such as the ones which also hold the shroud in place. If a longer capscrew is used it will thread too deeply into the hole and crack off the fins on the cylinder. Measure the length of the bolts by holding them next to the hole in which they are to be used.

l. Replacement of Flywheel and Starting Rope Sheave.—Replace the Woodruff Key which prevents the flywheel from turning on the shaft. Then assemble the flywheel to the shaft. Use a new lockwasher, and screw the starting rope sheave on to the crankshaft by hand. Use a monkey wrench to tighten the starting nut and strike it sharply with a hammer until the sheave draws up tightly against the flywheel. Then replace the set screw which helps lock the sheave in place.

m. Replacement of Shroud and Fuel Tank.—Assemble the fuel tank to the shroud with the two capscrews, washers and nut provided. Assemble the entire unit to the engine and replace the capscrews and washers. **As previously mentioned by sure the right length capscrews are used.** Tighten all cylinder head capscrews alternately and securely.

n. Replacement of Spark Plug and Wiring.—Inspect, clean and adjust the spark plug every 50 operating hours. Use solvent to remove carbon and gum deposits. Inspect the porcelain insulator and if chipped or cracked replace the plug. Reset the gap between the points to .025″ using a point tool

or similar instrument (see figure 20). Then replace the spark plug and connect spark plug wire.

o. Replacement of Muffler.—Screw the street ell into the cylinder, lock in position with the cap-screw provided and screw the muffler in place.

After the engine has been completely assembled it should be run in before using. Run at about ¼ throttle for about ½ hour and then at governor speed without load for two hours. Then drain the oil used for running in.

16. LEAD DEPOSITS IN COMBUSTION CHAMBER AND ON VALVES.

a. Many present day gasolines are treated with lead compounds in order to raise the octane rating of these fuels so that they can be used in engines without causing detonation with its evil effects. In many cases it is necessary to use leaded gasoline, because non-leaded fuels are not available. If non-leaded fuels are available, they should be used.

While this lead treatment of gasolines raises the octane rating of the fuel, it is also a fact that the lead compounds will deposit in the combustion chambers of the engines, on the valve heads and stems, and some will also work down into the crankcase lubricating oil, which will eventually take on the appearance of light gray paint. All of these deposits have a bad effect on the engines, but the one which will show up serious results first, is the deposit on the valves. These deposits build up to a thickness of about 1/32 of an inch, in about 50 hours of operation. This building up process is more pronounced with engines running constantly at the same speed and load, than when operating intermittently at varying loads and speeds.

b. When these deposits reach a thickness of about 1/32", they will crack and flake away in patches, after which the deposits will build up again and so on indefinitely. When this breaking away in patches occurs on the beveled seats of the valves, leakage will occur at these points and the flame of combustion will blow through causing burning of the valves. This condition occurs in all types of engines, whether air-cooled or water-cooled.

c. A method of removing these deposits without taking the engine down and scraping, has been found and this consists of injecting water into the engine through the carburetor while the engine is hot and running at normal speed. This water is instantly turned to steam when it strikes the walls of the combustion chamber, and valves, and during this process the lead will crack away. Much of the lead will be discharged with the exhaust gases, but some of it will find its way to the crankcase lubricating oil, adding to whatever lead was deposited there during the operation of the engine.

It is therefore absolutely necessary that the old crankcase oil be drained and fresh oil added after the water injection operation, otherwise damage might be done due to lubricating the engine with contaminated oil.

d. The best time for the water injection operation is just before it is necessary to change the lubricating oil in the crankcase, which should be done every 50 hours of operation. The water injection should be done at least once every 100 hours, and even every 50 hours would be better. The engine has no inlet manifold, the carburetor being bolted directly into the cylinder. Therefore, the water should be injected directly into the carburetor air intake opening, after the air cleaner has been removed from the carburetor.

e. With squirt can in one hand, the other hand on the carburetor choke lever, squirt the water into the carburetor until the engine slows down. Before the engine is stopped, however, interrupt the water injection and close the carburetor choke partly, until the engine recovers its speed, then open the choke and continue the water injection as above until about a pint of water has been used (see figure 40). The squirt can should have an opening in the spout of about 1/32-inch diameter, which is about standard for these cans.

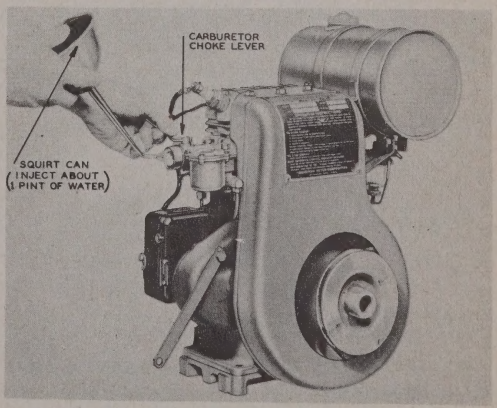

FIG. 40—WATER TREATMENT FOR REMOVAL OF LEAD DEPOSITS

Be sure the air cleaner is replaced after the above operation.

f. During very cold weather, it is especially important that the engine be hot, otherwise the injection operation will not be effective. The injection had best be done immediately after the engine has been running under full load.

The water must be fresh (not salt water) and clean, free from sand and grit, otherwise the engine may be scored. After all of this water has been injected and while the engine is still hot, all of the crankcase oil should be drained and replaced with fresh oil.

The engine should now be ready to continue on its regular duty.

g. The injection of water will also remove deposits back of the piston rings, and after the injection operation and changing of the crankcase oil have been properly carried out, the engine should run smoother and with increased power. It will not do much good to feed the water into the engine slowly. The best results are obtained by feeding the water in rapidly so that the engine will be slowed down considerably, and so that steam will be ejected out of the exhaust.

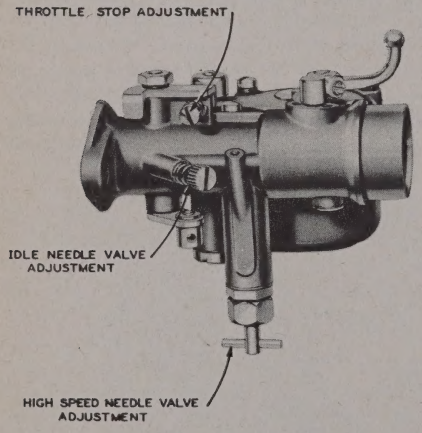

FIG. 41—COMPLETE CARBURETOR ASSEMBLY

17. CARBURETOR DISASSEMBLY.

Figure 41 shows the carburetor completely assembled and the high speed needle valve, idle needle valve, and throttle stop adjustment.

a. Remove high speed needle valve adjustment and gasket using a ½-in. open end wrench. Remove main discharge jet using a screwdriver of suitable size to avoid damaging part. Remove strainer plug gasket and strainer (see figure 42).

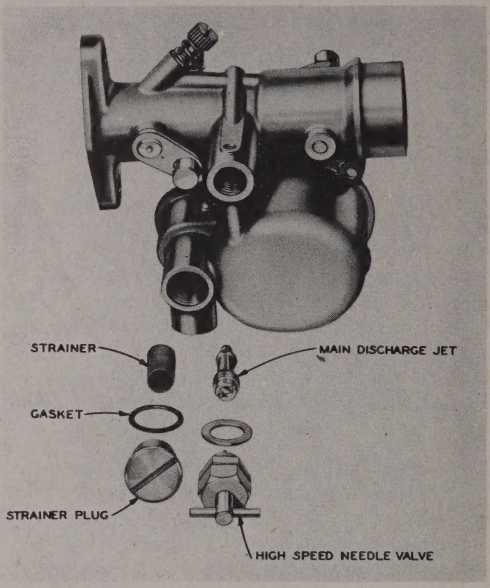

FIG. 42—CARBURETOR DISASSEMBLY—FIRST STEP

b. Remove idle needle valve and spring. Remove throttle stop screw and spring. Remove throttle stop lever, nut, lockwasher and lever. Remove throttle valve screw, valve and throttle shaft.

c. Loosen choke lever setscrew and remove lever. Remove choke lever screws, lockwashers, valve and choke shaft.

d. Remove float chamber cover screws, lockwashers, cover and cover gasket.

e. Remove float fulcrum pin spring. Remove float, fulcrum pin and float needle valve. With a large suitable screwdriver, remove float needle valve seat and gasket (see figure 43).

f. Carburetor Reassembly.—Insert choke shaft into body from lower side of main body and assembly choke valve making certain that the valve seats around the entire edge when it is in closed position. Assemble choke lever on choke shaft with ball plunger in one of the indent holes on top of the body. Apply light pressure on the lever to slightly compress the plunger spring and when held in this position, fasten setscrew securely. Make certain that choke valve operates freely.

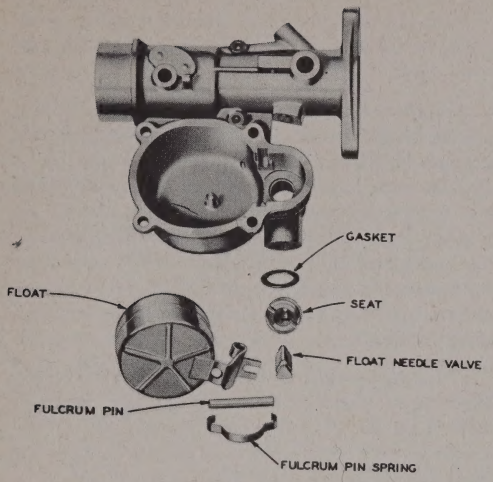

FIG. 43—CARBURETOR DISASSEMBLY—FINAL STEPS

g. Insert throttle shaft into the body from lower side. Hold shaft with the countersunk end of hole on the right side of the center line. Place throttle valve in shaft with the projections on the valve on the right hand side. Assemble throttle valve screw loosely and with a small screwdriver tap lightly on the high side of the valve to aid in centering it. Hold in closed position and tighten screw securely. Place throttle stop lever on shaft with long end towards choke shaft and with ear down towards the body. Assemble lockwasher and nut. Assemble throttle stop screw and spring. Hold throttle valve in closed position. Turn in the stop screw until it just contacts the lever and then turn in an additional one-half turn. Assemble idle needle valve and spring, seating needle valve lightly with fingers and turn out one-half turn.

h. Assemble float needle valve seat and gasket securely. Assemble gasoline strainer, plug and gasket. making certain that the strainer fits over the lower end of the float needle valve seat. Assemble main discharge jet securely. Unscrew high speed needle adjustment at least two turns to avoid damaging needle valve point when it is assembled into the body. Assemble high speed needle and gasket securely. Turn the adjustment in until it seats and turn out approximately one and one-half turns. This is only a preliminary setting and final adjustment will have to be made on the engine (see figure 44).

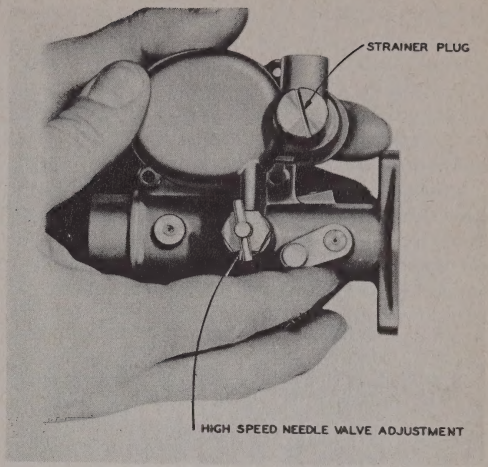

FIG. 44—HIGH SPEED NEEDLE VALVE ADJUSTMENT

i. Insert float fulcrum pin in float lever. Attach float needle valve into fork of float lever. Assemble float and these parts into the body. Assemble float fulcrum spring in slots in the body and with the flanged ends resting on top of float fulcrum pin; curved section of spring is towards the top (see figure 45).

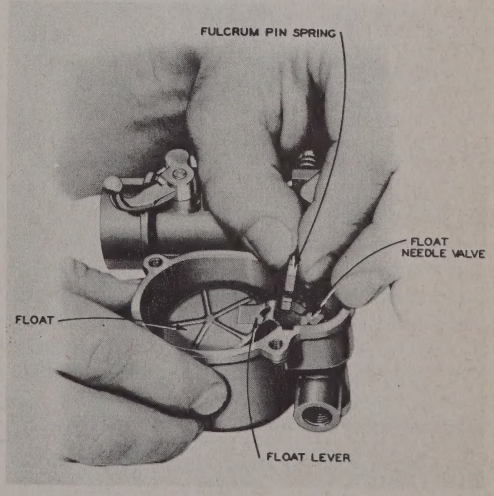

FIG. 45—ASSEMBLY OF FLOAT FULCRUM

j. Fuel Level.—In order to obtain the most efficient operation from a carburetor it is necessary that the fuel level be maintained at the correct height in the float chamber. The correct fuel level for the carburetor is $17/32$" from the gasket surface

of the float chamber with the inlet pressure one-half to one pound. This can be checked either on the engine or on a test stand. When checking the level, it is necessary to hold the fulcrum spring down so that the float parts are in their normal position. The height of the level can be measured by placing a standard depth gauge between the side of the float chamber and the float making certain that the scale does not contact either part as it will result in an incorrect reading. If the level needs to be changed, bend the float lever at the hole on top to obtain the desired height. When doing this operation use a pair of long-nose pliers (see figure 46).

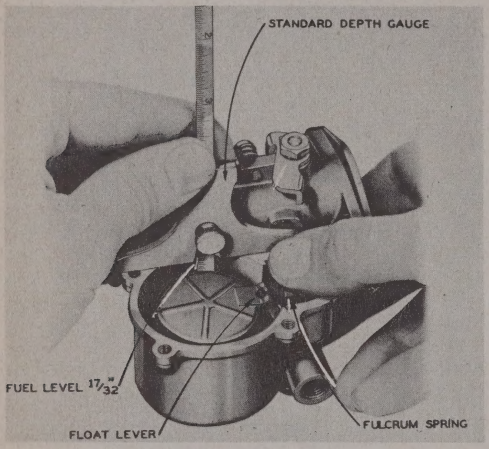

FIG. 46—ADJUSTING CARBURETOR FUEL LEVEL

k. Assemble float chamber cover and gasket.

18. MAGNETO.

a. Be certain that the ignition spark produced at the magneto and cap socket is unsatisfactory before the magneto is dismounted from the engine or any dismantling of the unit begun. In describing the complete overhaul of the magneto it is assumed that the radio-shielded spark plug cable has been removed from the end cap outlet and that the magneto has been dismounted from the engine.

b. Removal of the Drive Gear.—Drive out the lockwire inserted in the end of the rotor shaft, after which secure the coupling gear in a vise. (The vise jaws should be copper-covered to prevent injury to the gear, although wooden jaws are suitable.) Fit a ¾" hex head socket wrench to the slots of the coupling nut and turn against the spring-windup of the impulse coupling until the nut releases. After the nut has been taken off the rotor shaft, pull the drive gear away from the impulse coupling shell. Note the small bushing which fits the gear to the rotor shaft.

c. Removal of Impulse Coupling.—Grasp one of the drive lugs of the impulse coupling shell firmly in the jaws of a pair of pliers and remove the shell from the assembly by a combination of pulling and turning motions. Be careful not to stretch the drive spring in this operation; if the spring does not free itself from the coupling hub, pry it loose from the slot in the hub with a screwdriver. Place magneto in a vise, and separate the coupling hub from the rotor shaft.

d. Replacement of Coil.—To remove the coil from the magneto frame, loosen the two setscrews which hold the coil bridge laminations. Use a screwdriver in first-class condition and of exactly the right size when releasing these setscrews.

e. Replacement of Condenser.—Remove the condenser from the magneto by taking out the terminal screw of the breaker assembly and the condenser mounting screw. Test the condenser on a reliable condenser tester for shorts, opens and leakage, and for capacitance, which in this case lies between 0.17 and 0.21 mfd.

f. Replacement of Breaker Points.—Free the breaker arm from the assembly by removing the terminal screws; dismount the stationary bracket point support by removing the locking screw. Examine the eccentric head adjusting screw and replace if necessary. Replace badly pitted or worn breaker points, although it is sometimes possible to resurface the points to their original condition. Resurface with a tungsten file or fine stone and leave the center of each point very slightly higher than its edges.

g. Removing Magnetic Rotor from Frame.—The magnetic rotor of the magneto is locked in the drive and thrust ballbearing. Remove only according to the sequence of operations described below:

(1) Remove the outer retaining washer from the frame recess at the drive end of the rotor. This washer can be easily pried out with a screwdriver.

(2) Remove the rubber sealing washer located immediately underneath the outer retaining washer; this may require the use of a sharp tool. If the rubber has hardened, discard it and use a new washer in reassembly.

(3) Remove the inner retaining washer. This washer is a loose fit in the frame recess but may be difficult to lift out due to adhesion of the bearing grease.

(4) Release the rotor shaft snap ring which locks the magnetic rotor in the ball bearing. This snap ring can be best removed by using a knife or sharpened screwdriver.

(5) Remove any shims which are found between the snap ring and ball bearing.

(6) Now place the magneto assembly in a screw press, being certain to provide clearance for the rotor as it is pressed out of the assembly. Center the cam end of the rotor in a large hole of the lower plate of the press and place a protective cap over the threaded end of the rotor shaft. Apply an even pressure by turning down slowly the drive screw of the press. As soon as the rotor has been pressed out of the ball bearing, remove the magneto from the press and lift the rotor out of the frame.

h. Removing the Rotor Ball bearing.—After the magnetic rotor has been taken out of the frame, remove the snap ring holding the ball bearing, together with the insulating washer. Place the magneto frame in a screw press, with the brass cap centered on the bearing. Turn the screw down and push the ball bearing out of the frame recess; then remove the insulating strip and washer adjacent to the bearing. If the ball bearing is not worn or damaged, thorough cleaning in solvent and repacking with ball bearing grease will place it in first-class condition.

i. Replacing Ball bearing.—Place the inner insulating washer and insulating strip in the frame recess and push the ball bearing as far as possible by hand in order to center it with respect to the insulating strip. Then replace the frame in the screw press with a small support block centered on the ball bearing and the brass cap placed between the block and the screw of the press. Check the line-up of parts to be certain that pressure exerted will be perpendicular, then turn down the screw until the bearing is completely within the frame recess. Place the outer insulating washer next to the bearing and spring the large snap ring into place.

j. Replacing the Rotor in the Frame.—Push the magnetic rotor by hand partially into place; then put the assembly in the screw press and line up so that pressure can be applied perpendicularly. Place the brass cap over the end of the rotor shaft and turn down the screw of the press until the snap ring groove of the rotor shaft appears on the drive side of the ball bearing. Slip one or more of the thrust bearing shims on the rotor shaft as required to make the rotor shaft snap ring fit tightly against the bearing. Drop the inner retaining washer into place and push the rubber sealing washer into its position. Complete the assembly by fixing the outer retaining washer in place by upsetting the frame metal at several points along its edge.

k. Reassembly of Bearing Plate.—Next slip the bearing plate with its sleeve bearing over the cam end of the rotor and screw into place in the magneto frame. Assemble the stationary breaker point support bracket to the plate and insert the eccentric head adjusting screw. Mount the condenser on the bearing plate and slip the breaker arm on its fulcrum pin. Fasten together the lead wires from the coil, condenser, ground switch and the spring leads of the breaker arm by inserting the terminal screw at the lower end of the stationary support bracket. Adjust the breaker contact points to have 0.020″ opening at full separation (see figure 18). Assemble the end cap to the frame, using a new end cap to frame gasket and coating the entire joint with gasket sealing varnish.

l. Reassembly of Impulse Coupling.—Thoroughly clean the impulse coupling in Diesel oil and wipe dry before reassembly. Do not put oil or grease on the hub plate or its pwal, and keep the inside of the shell free of oil and grease. However, put a small amount of grease on the drive spring. First insert the drive spring in the coupling shell, and anchor the outside in the round socket (be certain it is coiled in the correct direction—clockwise from outer end). Connect the hub assembly and the inside end of the drive spring and wind the spring approximately ¾ turn, after which push the hub into place. Check to be sure that the coupling pawl stop pin is tightly screwed into the magneto frame. Assemble the complete coupling to the magnetic rotor shaft, keying it in position. Turn the coupling until the pawl engages and assemble the drive gear to the coupling so that the coupling lugs are engaged by the slot of the drive gear. The marked tooth of the gear must be along its upper edge when this assembly is made in order to permit subsequent timing to the engine. Now insert the coupling gear bushing between the gear and the rotor shaft and tighten down the coupling nut on the assembly. Finally insert the lockwire in the slots of the coupling nut and through the rotor shaft and bend the ends out to prevent loosening.

19. GENERATOR BRUSHES.

a. Six brushes (Figs. 66 and 67, items 186 and 187) are used in PE-108 (*)—four d-c and two a-c. The d-c brushes carry a low voltage and for this reason are largely copper, which is an excellent conductor; the a-c brushes carry a high voltage and are chiefly carbon. Under ordinary circumstances both types will operate for long periods without requiring replacement. They should be inspected aftery every 50 hours of operation.

b. To check brush wear, remove the generator end cover, remove staples from d-c brush holders and remove caps from a-c brush holders. Remove brushes one at a time, check for length and be sure that each moves freely in the brush holder, and replace in exactly the same position from which it was removed. Replace staples and brush holder caps.

c. If brushes are worn to a length of $\frac{3}{8}$", replace them. Replace only in sets—never a single a-c brush or a single d-c brush.

d. Poor contact between brush and commutator is caused by oil and grit, flint, or other hard substance in the brush, or by brushes not properly shaped to fit the commutator over the whole of their surface. Remedy these defects by smoothing the commutator with No. 00 sandpaper by placing the sandpaper under the brushes with the abrasive side to the brushes and working back and forth until the brushes are the same shape as the commutator.

20. COMMUTATOR.

a. Keep the commutator free from carbon dust or other dirt. Use a lint-free cloth for this purpose, and maintain a high polish on the commutator if necessary by the application of a commutator dressing stone or No. 00 sandpaper.

b. A hard mica is used as an insulator between the commutator bars. This is under cut about $\frac{1}{32}$" below the surface of the bars. As the copper wears down, the mica which is harder forms ridges which cause the brushes to jump with resultant poor contact. The armature should be removed from the unit and the mica should be undercut by qualified personnel at a repair depot.

c. Use no lubricant of any type on the commutator. The use of any lubricant will only cause sparking, poor contact, pitted bars and decrease the output of the generator.

d. Collector Rings.—These are two continuous copper rings located at the end of the rotor. The surface should be maintained in a high state of polish by occasional use of crocus cloth.

21. TEST PROCEDURES.

a. Condensers.—The PE-108 (*) is equipped with three condensers connected from the brushholders to the brushholder bracket, which is in turn grounded. These are for the purpose of minimizing radio interference. A short-circuited condenser will result in no output from the generator. To determine whether or not a condenser is shorted, disconnect the lead wire from the brushholder to which it is connected. If the generator produces current, replace the condenser with a new one. If it does not, failure is caused by some other trouble.

b. Testing Field for Open Circuits.—First, disconnect battery wires from the unit. **Raise all brushes from commutator and collector rings.** Disconnect field wire. Connect one end of test lamp wire to one field wire. Connect other end of test lamp wire to other field wire. If test lamp does not burn, field circuit is open. **NOTE: Broken wires or loose connections between generator field and control panel should be checked first. An open circuit in the field winding will prevent the plant from generating.**

c. Testing Field for Grounds or Short Circuits.—Disconnect battery and a-c line wires from the unit. **Raise all brushes from commutator and collector rings.** Disconnect field wire. Connect one end of test lamp wire to field wire. Place other end of test lamp wire to ground on a clean surface of the generator frame. If test lamp burns, the field circuit is grounded. If test lamp fails to burn, the field circuit is not grounded.

NOTE: A ground in the field circuit will be indicated by the generator failing to produce current. Shorted field coils will run much hotter than the rest, and may be located by feeling the temperature of the coils.

d. Testing Winding of Armature for Grounds.—First, disconnect battery wires from the unit. **Raise all brushes from commutator and collector rings.** Place one end of test lamp wire on commutator. Touch other end of test lamp wire on clean surface of armature shaft. If test lamp burns, the armature winding is grounded. If test lamp does not burn, the winding is not grounded.

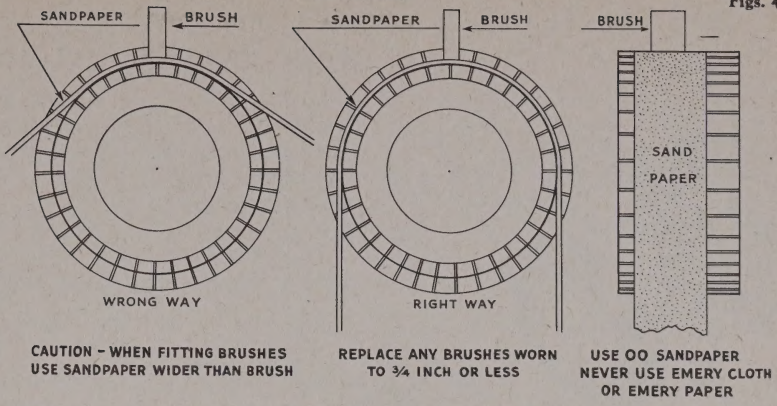

Fig. 47 - Care of the Brushes

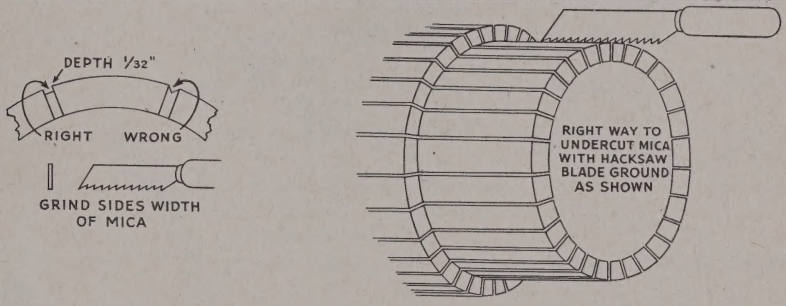

Fig. 47-A - Care of the Commutator

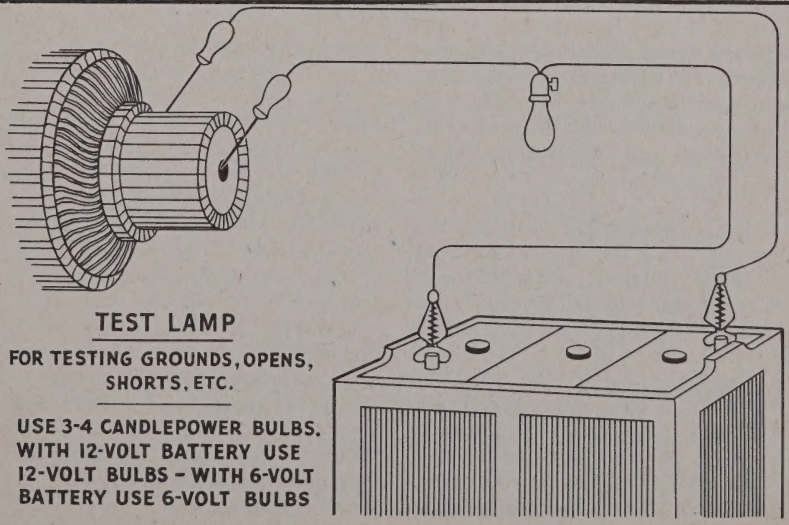
TEST LAMP
FOR TESTING GROUNDS, OPENS, SHORTS, ETC.
USE 3-4 CANDLEPOWER BULBS. WITH 12-VOLT BATTERY USE 12-VOLT BULBS - WITH 6-VOLT BATTERY USE 6-VOLT BULBS

Fig. 48 - Testing Armature for Shorts and Opens

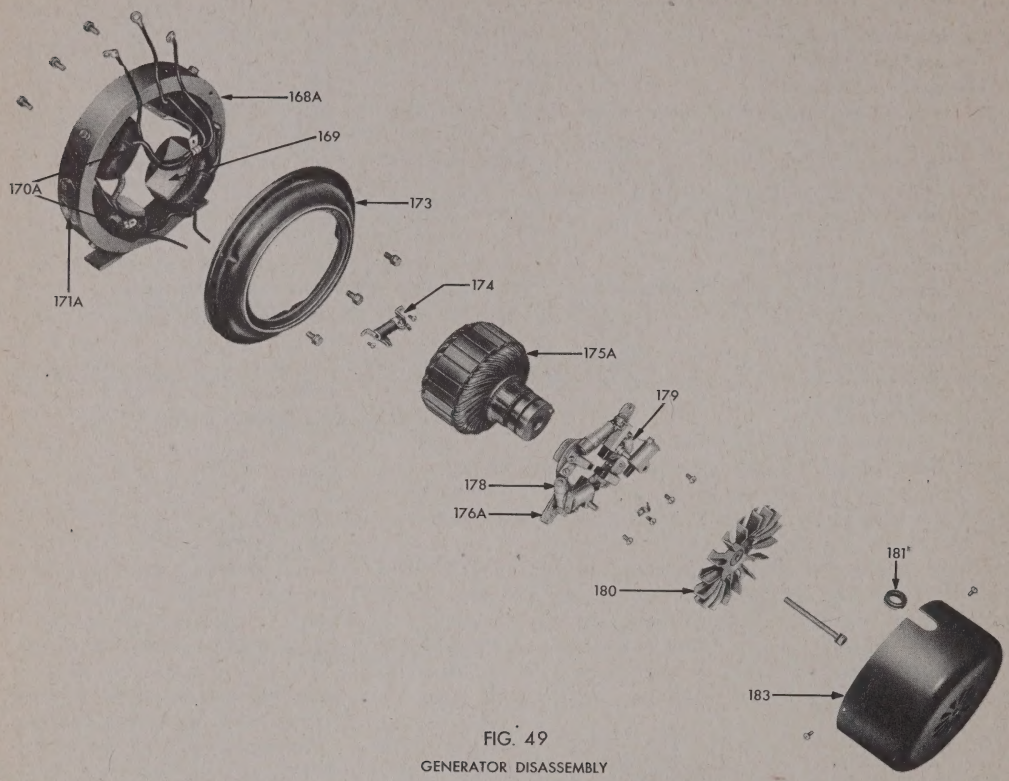

FIG. 49
GENERATOR DISASSEMBLY

NOTE: A shorted or grounded armature circuit will generally be indicated by overheating of the armature or burned windings. The unit will run, but no current will be generated. (Should be repaired only by Repair Depot personnel.)

e. Control Box.—No adjustments in the field should be necessary on the control box except the adjustment of the d-c charging resistor. (See paragraph *g* below.) If any troubles develop in the control box, the unit should be serviced by qualified personnel only.

f. The start solenoid provides the means by which the current from the starting batteries is passed to the exciter series field of the generator without the use of long, heavy cables running directly from the panel. The solenoid requires no attention. In the event that it fails to function, it must be replaced by a new unit.

g. Charging Resistors.—Power Units PE-108-A, B, C, D are equipped with a variable charging resistor (Fig. 6, item R73) inside the control box cover at the top. The resistor is pre-set to give a trickle charge of 2 to 4 amperes. To increase the charging rate, loosen the screw in the movable contact and move the contact toward the indication HIGH on the upper lip of the box; to decrease the charging rate, move towards LOW. Be sure to tighten the screw after making this adjustment. PE-108-E employs two fixed resistors, connected so that the rate may be varied by means of a toggle switch. For low charge (3 to 5 amperes) throw the switch to LOW CHARGE. This condition permits use of the full a-c output of the unit. For rapid charging (15 to 20 amperes) throw the switch to HIGH CHARGE. (This condition automatically disconnects the a-c load.)

22. ENGINE TROUBLE AND REMEDY CHART.

a. Engine will not start.—

Possible Cause	*Check*	*Remedy*
(1) Gasoline tank empty.	Check fuel supply.	Fill gasoline tank.
(2) Gasoline line clogged.	Check screen and gasoline line. Check carburetor float.	Clean filter screen, blow out fuel lines.
(3) Poor grade of fuel or water in gasoline.	Check filter and carburetor and and fuel in tank.	Replace with fresh fuel.
(4) Loose or defective wiring.	Check wire connections.	Tighten connections.
(5) Spark plug dirty or cracked.	Check for excessive carbon or cracks.	Clean plug or replace.
(6) Spark plug gap not adjusted properly.	Check with feeler gauge for .025″.	Bend contact points to .025″ gap.
(7) Improper gasoline mixture	Check float level and needle valve adj.	Adjust level of float and adjust needle valve.
(8) Throttle rod loose.	Check rod from governor to carburetor.	Tighten rod.
(9) Throttle valve out of adjustment or stuck.	Check throttle valve and governor.	Remove and clean valve.
(10) Valve seats pitted.	Check for loss of compression.	Return unit to depot for regrinding or replacement.
(11) Valves sticking.	Check valve springs and valve stems for excessive carbon. Check for bent valve stems.	Clean springs and clean valve stem.
(12) Valve adjusted too tightly.	Check valve clearance with feeler gauge.	Adjust to proper clearance.
(13) Improper timing.	Check magneto point opening.	Clean or replace points and set gap to .020″. Check valve timing.
(14) Defective magneto.	(*a*) Check to see if magneto coil is burned out.	(*a*) Replace coil.
	(*b*) Breaker points pitted or worn.	(*b*) Clean points with fine grit hone or, if badly pitted, replace.
	(*c*) Breaker points out of adjustment.	(*c*) Adjust to proper gap.
	(*d*) Check condenser for leaks or weakness.	(*d*) Replace condenser.
	(*e*) Check to see if high-tension wire is shorted.	(*e*) Replace if wire is broken or insulation damaged.
(15) Air or compression leaks from loose bolts or defective gaskets.	Check for oil or air leaks.	Tighten bolts or replace gaskets if damaged or broken.

b. Engine misfiring.—

Possible cause	*Check*	*Remedy*
(16) Loose electrical connection.	Check connections.	Tighten connections.
(17) Spark plug dirty or cracked.	Check for excessive carbon or crack.	Clean plug. Replace plug if cracked
(18) Spark plug gap adjusted incorrectly.	Check with feeler gauge for .025″.	Bend contact points to .025″ gap.
(19) Magneto high-tension coil burned out or weak.	Check by trying another coil.	Replace coil.

22. ENGINE TROUBLE AND REMEDY CHART.—(Cont.)

Possible cause	*Check*	*Remedy*
(20) Ignition breaker points sticking or out of adjustment.	Check distance of gap.	Clean points. Adjust gap to .020"
(21) Defective wiring.	Check for broken wires or damaged insulation.	Replace or repair wire.
(22) Valves warped or broken.	Check by removing valves and inspecting them.	Replace with new valves. This should be done at Signal Corps repair depot.
(23) Valve tappets sticking.	Check by turning motor over by hand to see how valves function.	Clean carbon from tappets. This should be done at Signal Corps repair depot.

c. Engine overheated.—

Possible cause	*Check*	*Remedy*
(24) Valve tappets improperly adjusted.	Check clearance with feeler gauge.	Adjust to proper clearance.
(25) Oil level too low.	Check oil level by removing oil filler cap.	Add oil to top of filler plug opening.
(26) Improper gasoline mixture.	Check float level and needle valve adjustment.	Adjust level of the float and adjust needle valve.
(27) Carburetor choke valve partly closed.	Check valve.	Adjust valve to open completely and close completely.
(28) Piston rings sticking.	Check by removing piston and examining rings.	Clean carbon from ring grooves. This should be done at Signal Corps repair depot.
(29) Insufficient ventilation of motor.	Check to see if there is 2-feet clearance on all sides of unit.	Provide more space.
(30) Improper timing.	Check magneto point opening.	Adjust so that points break when piston is on firing stroke.
(31) Muffler clogged.	Check to see if explosions from exhaust are continuous or alternating. They should be alternating.	Replace muffler.
(32) Air cleaner dirty.	Check for dirt in bowl or on screen by removing filter.	Clean out bowl and screen.
(33) Air fins clogged.	Check for dirt or grass in fins.	Clean out dirt or other obstructions.
(34) Governor or throttle loose.	Check to see if rod from governor to carburetor is disconnected.	Connect and tighten rod.

d. Engine knocks.—

Possible cause	*Check*	*Remedy*
(35) Poor gasoline.	Check source and grade of fuel.	Replace with fresh leaded gasoline.
(36) Sticking valves.	Check valve springs and valve stems for excessive carbon. Check for bent valve stems.	Replace springs or clean carbon from valve stems. This should be done at Signal Corps repair depot.
(37) Broken valve spring.	Check by removing valve cap cover and observing.	Replace valve spring.
(38) Carbon in cylinder.	Check by removing spark plug and and observing through spark plug hole.	Remove cylinder head and clean out carbon.
(39) Loose main bearings.	Check for oil leaks in front and rear of engine.	Replace bearings. This should be done at Signal Corps repair depot.
(40) Loose rod bearings.	Short plug while engine is running to see if noise disappears.	Tighten rod if possible, otherwise replace.

22. ENGINE TROUBLE AND REMEDY CHART.—(Cont.)

Possible cause	*Check*	*Remedy*
(41) Improper adjustment of carburetor.	Check float valve and needle valve adjustment.	Adjust level of float and adjust needle valve. Drain out dirt and water in carburetor bowl.
(42) Loose valve tappets.	Check valve clearance with feeler gauge.	Adjust to proper clearance.
(43) Tight pistons.	Check engine for seizing under full load.	Remove, check ring and piston clearance. Renew if necessary.
(44) Lack of oil or insufficient oil.	Check oil level by removing filler cap.	Add oil to top of filler plug opening.
(45) Loose flywheel.	Check by stopping motor and determining play of flywheel by rocking against compression.	Remove flywheel. Examine Woodruff key. Key may need replacement.
(46) Improper timing.	Check to see if flywheel key is sheared. See c.	Replace flywheel key. See c.
(47) Engine overheated.	See c.	See c.
(48) Worn piston and cylinder.	Check by turning engine over by hand to see if compression is satisfactory, after determining that valves are in good condition.	Replace piston. Send engine to depot for repairs.
(49) Loose piston pin.	Check by shorting spark plug to see if noise disappears.	Replace piston pin or connecting rod. This should be done at Signal Corps repair depot.

e. Faulty carburetion.—

Possible cause	*Check*	*Remedy*
(50) Carburetor improperly adjusted.	Check float level and needle valve adjustment.	Adjust level of float and adjust needle valve.
(51) Sediment in fuel tank.	Check sediment in fuel tank.	Flush tank and gasoline line and refill with fresh fuel.
(52) Screen on filter bowl clogged.	Check by removing filter bowl and examining screen.	Clean screen and gasoline line.
(53) Shut-off valve closed.	Check by turning valve to see if gasoline flows to filter bowl.	Clean out fuel tank. Open valve.
(54) Vent hole on cap of gasoline tank clogged.	Check by removing gasoline tank cap and blowing through vent hole.	Clean vent hole on cap.
(55) Valves leaking.	Check by removing valves and inspecting them.	Send to depot for repairs.

f. Explosions in carburetor.—

Possible cause	*Check*	*Remedy*
(56) Improper timing.	Check magneto point opening.	Set opening to .020".
(57) Gasoline mixture too lean.	Check by opening needle valve slightly while engine is running.	Open needle valve to best adjustment.
(58) Intake tappets sticking.	Check by turning motor over by hand to see how valves function.	Clean carbon from tappets or replace springs if weak. Return to depot if necessary.
(59) Intake valve springs weak.	Check by turning motor over by hand to see how valves function.	Replace springs. Return to depot if necessary.
(60) Intake valves warped or broken.	Check by removing valves and inspecting them.	Return to depot.
(61) Intake tappets set too close.	Check valve clearance with feeler gauge.	Return to depot.

22. ENGINE TROUBLE AND REMEDY CHART.—(Cont.)

Possible cause	*Check*	*Remedy*
(62) Intake valve sticking.	Check valve stems for excessive carbon. Check valve spring. Check for bent valve stems.	Replace spring or clean carbon from valve stem. Return to depot if necessary.

g. Excessive smoke from exhaust.—

Possible cause	*Check*	*Remedy*
(63) Carburetor needle valve open too far.	Check by closing needle valve slightly.	Close needle valve to best adjustment.
(64) Poor fuel.	Check source and grade of fuel.	Replace with fresh gasoline.
(65) Worn piston and piston rings.	Check by turning engine over by hand to see if compression is satisfactory, after determining that valves are in good condition.	Replace rings and piston if necessary. This should be done at Signal Corps repair depot.
(66) Carburetor float sticking or leaking.	Check float level and remove float and examine for leaks.	Adjust level of the float. Replace with new float if necessary.
(67) Worn connecting rod bearing.	See *d* (40).	See *d* (40).
(68) Too light oil.	Drain small quantity and check.	Drain and refill with heavier oil.

h. Poor compression.—

Possible cause	*Check*	*Remedy*
(69) Defective or missing spark plug gasket.	Check by removing plug and examining gasket.	Replace with new gasket.
(70) Loose spark plug.	Check plug for tightness.	Tighten plug.
(71) Cracked spark plug.	Check by removing and examining plug.	Replace plug.
(72) Cylinder head gaskets blown.	Check gaskets for air leaks.	Replace gaskets.
(73) Valves sticking.	Check valve stems for excessive carbon, also valve springs. Check for bent valve stems.	Replace springs or clean carbon from valve stems. Return to depot if necessary.
(74) Valves not seating.	Check by removing valve to see if warped, or if excessive carbon around valve seat.	Replace valve or return to depot for grinding.
(75) Valve tappets sticking.	Check by turning motor over by hand to see how valves function.	Clean carbon from tappets or replace springs if weak. Return to depot if necessary.
(76) Valve tappets set too close.	Check valve clearance with feeler gauge.	Adjust to proper clearance.
(77) Piston rings sticking.	Check by removing piston and examining rings.	Clean carbon from ring grooves. This should be done at Signal Corps repair depot.
(78) Piston rings broken.	Check by removing piston and examining rings.	Replace with new rings. Return to depot.
(79) Worn piston and cylinder.	Check by turning engine over by hand to see if compression is satisfactory, after determining that valves are in good condition.	Replace piston. Send engine to depot for repairs.

Section IV

23. GENERATOR TROUBLE AND REMEDY CHART.

a. Sparking at the brushes.—

Possible cause	*Check*	*Remedy*
(1) Too much load.	Check voltmeter and ammeter (PE-108-D and E) readings to make sure they indicate voltage and current as marked on the nameplate.	Reduce the load.
(2) Brushes not seated properly. Dirty brushes and commutator.	Remove brushes and check for uneven wear or dirt on brushes or commutator.	Adjust brushes with fine sandpaper.
(3) Rough or eccentric commutator.	Check for uneven wear on commutator and brushes.	If only slightly rough, use coarse cloth or very fine sandpaper; if rough, send unit to depot.
(4) Open armature.	Check to see if coil lead is disconnected or coil open.	Solder coil lead back on or return to depot.
(5) Grounded or open or shorted field winding.	Check for breaks or shorts in the field.	Open or shorted fields should be replaced. A grounded field may be repaired by insulating at the point where ground occurs. Return to depot for repairs.
(6) Brushes sticking in the holders.	Check to see that brushes move freely in holders.	Readjust brushes or replace with new ones.

b. Voltage too low.—

Possible cause	*Check*	*Remedy*
(7) Engine speed low.	Check speed with tachometer.	Increase speed of engine by adjusting speed regulator.
(8) Brushes not set properly.	Remove brushes and check for uneven wear.	Adjust brushes with fine sandpaper.

c. Voltage too high.—

Possible cause	*Check*	*Remedy*
(9) Speed of engine too high.	Check engine speed with tachometer.	Adjust speed by means of speed regulator.

d. Armature too hot.—

Possible cause	*Check*	*Remedy*
(10) Armature overloaded.	Check voltmeter and ammeter (PE-108-D and E) readings to make sure they indicate voltage and current as marked on the nameplate.	Reduce the load.
(11) Armature coil short-circuited.	Check for breaks.	Replace armature. This should be done at Signal Corps repair depot.
(12) Armature striking on pole pieces.	Check the engine bearing to make sure it is not worn out and also the line-up of the brackets.	Replace bearings and reline bracket if necessary. Return unit to Signal Corps repair depot.
(13) Poor ventilation.	Check air space around generator.	Make sure there is at least a 2-foot clearance on all sides of generator.

e. Commutator too hot.

Possible cause	*Check*	*Remedy*
(14) Sparking of brushes.	See *a*.	See *a*.
(15) Too much pressure on brushes.	Pressure should be approximately 2½ to 5 pounds per square inch.	Replace springs with weaker springs.

23. GENERATOR TROUBLE AND REMEDY CHART.—(Cont.)

Possible cause	*Check*	*Remedy*
(16) Too much load.	Check voltmeter and ammeter (PE-108-D and E) reading to make sure they indicate voltage and current as marked on the nameplates.	Reduce the load.
(17) Poor ventilation.	Check air space around generator.	Make sure there is at least a 2-foot clearance on all sides of generator.

f. Field coils too hot.—

Possible cause	*Check*	*Remedy*
(18) Short circuit in field coils.	Check for breaks in the field.	Open or shorted fields should be replaced. A grounded field may be repaired by insulating at the point where the ground occurs.
(19) Poor ventilation.	Check air space around generator.	Make sure there is at least a 2-foot clearance around all sides of generator.

g. Noisy generator.—

Possible cause	*Check*	*Remedy*
(20) Armature striking pole.	Check for loose wires.	Replace armature if necessary. Return unit to depot.

h. Generator fails to generate.—

Possible cause	*Check*	*Remedy*
(21) Short circuit in line.	Check for short circuits.	Replace armature or field coils if necessary. Return unit to depot.
(22) Too weak residual magnetism.	Check by passing current from battery through field coils.	Pass current from battery through field coils, making sure positive pole of battery is connected to positive lead of shunt field.
(23) Short-circuited armature.	Check for breaks in armature or dirt on commutator bars.	Remove dirt, etc. Replace armature. If necessary, return to depot.
(24) Grounded field.	Check for breaks in field.	Open or shorted fields should be replaced. A grounded field may be repaired by insulating at the point where the ground occurs. Return to depot.
(25) Reversed field coils.	Pass current through field coil and check to see that coils are alternate north and south.	Change position of coils. Return to depot if necessary.
(26) Brushes not making contact.	Check to see if brushes are stuck.	Make sure that brushes move freely in holders. Replace with new brushes if necessary.
(27) Condenser short-circuited.	Disconnect condenser and see if current flows in the line.	Replace condenser.

SECTION V
Supplementary Data

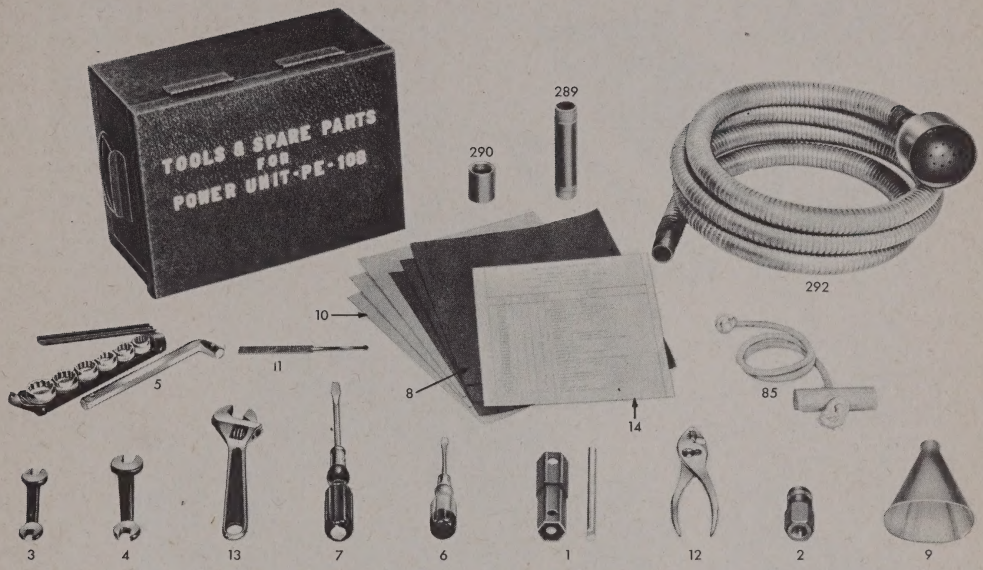

FIG. 50

PE-108 TOOLS AND ACCESSORIES

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24. CONTENTS OF TOOL BOX.

Ref. No.	Qty.	Description	Fig. No.	Pioneer Part No.	Manufacturer
1	1	Spark Plug Wrench	50	9467	WISC
2	1	Flywheel Puller 5/8" x 18 thread	50	9456	PGEN
3	1	Wrench Double Open End 3/8 x 5/16	50	9457	PGEN
4	1	Wrench Double Open End 1/2 x 7/16	50	9458	PGEN
5	1	Socket Wrench Set in Case	50	9459	PGEN
6	1	Screw Driver	50	9460	PGEN
7	1	Screw Driver	50	9461	PGEN
8	3	Crocus Cloth	50	9462	PGEN
9	1	Funnel (for oil)	50	9490	PGEN
10	3	Sand Paper (00)	50	9463	PGEN
11	1	Magneto File	50	9464	PGEN
12	1	Pliers	50	9465	PGEN
13	1	Wrench (8" crescent)	50	9466	PGEN
14	1	Identification Card	50	A-9543	PGEN

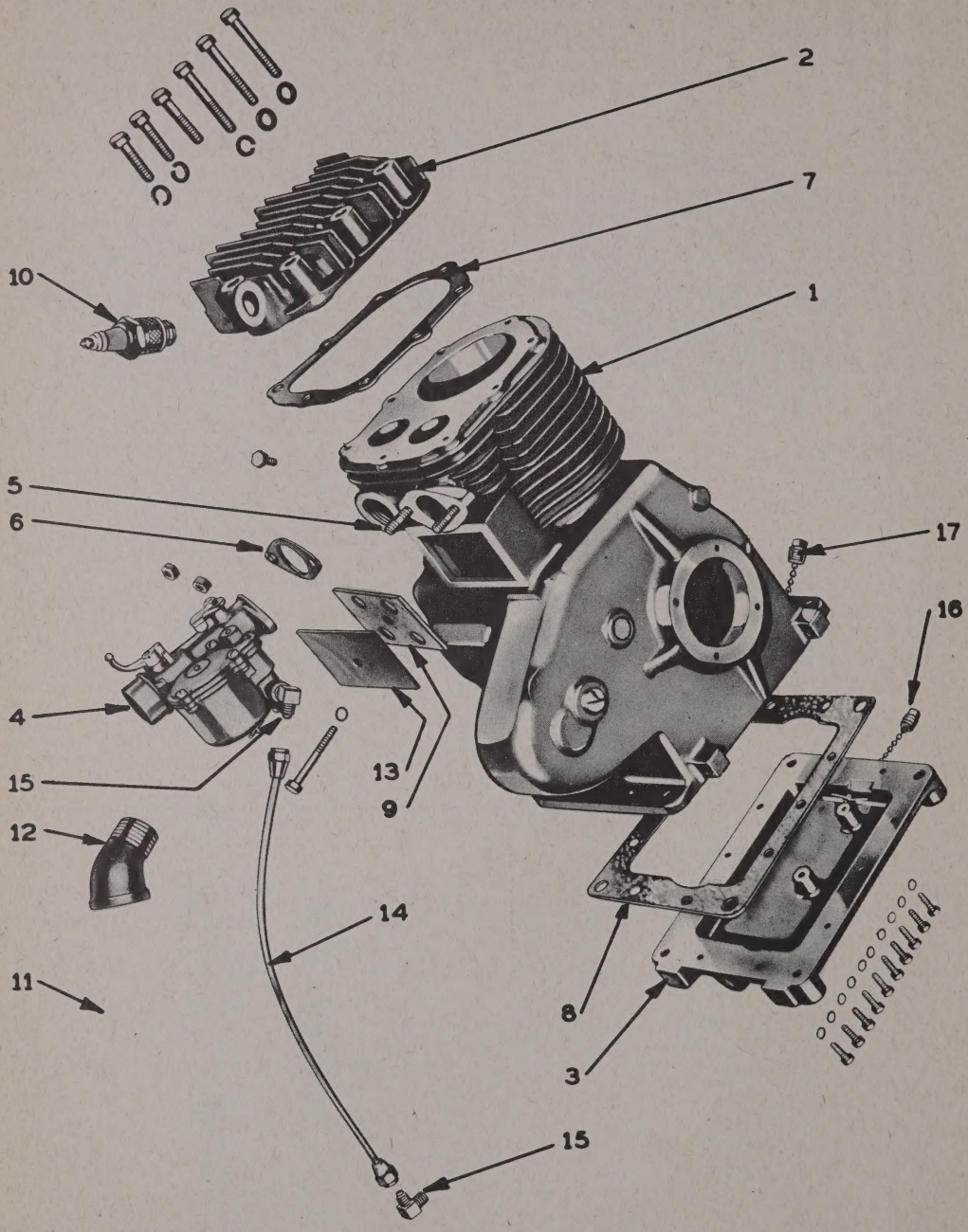

FIG. 51—MAIN ENGINE PARTS

25. TABLE OF REPLACEABLE PARTS—ENGINE

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
1	51		1	Cylinder and crankcase with valve insert	Main body	AA-81-G-1-S	WISC	A,B,C,
1-A	Not illus.		1	Cylinder and crankcase	Main body	AA-81K-1	WISC	D,E
2	51		1	Cylinder Head	Compressed gas vapor chamber	AB-76-K	WISC	A,B,C,
2-A	Not illus.		1	*Cylinder Head	Compressed gas vapor chamber	AB-76D-1	WISC	D,E
3	51		1	Engine base	Holds oil supply	BB-116-B	WISC	A,B,C,
4	51		1	Carburetor (for carb. assemb.)	Mixes air and gasoline	A-18010	STRO	A,B,C,D,E
5	51		2	Stud 1 5/16" long with 1/4-20 & 1/4-28 thread (special)	Carburetor mtg.	PC-368-2	WISC	A,B,C,D,E
6	51		1	‡*Gasket	Carburetor mtg.	QC-53	WISC	A,B,C,D,E
7	51		1	‡*Gasket	Cylinder head mtg.	QD-568-E	WISC	A,B,C,D,E
8	51		1	‡*Gasket	Engine base mtg.	QD-569-A	WISC	A,B,C,D,E
9	51		1	‡*Gasket	Valve insp. plate mounting	QD-572	WISC	A,B,C,D,E
10	51		1	‡*Spark plug	Furnishes spark to ignite gas vapor	#6M	CHAM	A,B,C,D,E
11	Not illus.		1	*Air filter bracket with 1QD-647 gasket—1 x D-8 screw		BI-225B-1-S	WISC	D,E
12	51		1	Elbow	Muffler mounting	XK-66-2	WISC	A,B,C,D,E
13	51		1	Cover	Valve tappet compartment cover	SA-61	WISC	A,B,C,D,E
14	51		1	*Fuel line	Fuel channel from tank to carburetor	RM-197	WISC	A,B,C,D,E
15	51		2	Elbow 1-in fuel strainer 1-in carburetor	Fuel line mounting	RF-270	WISC	A,B,C,D,E
16	51		1	Drain plug assembly	For oil drain in base	XK-2-8	WISC	A,B,C,D,E
17	51		1	Filler plug assembly	For filling crankcase with oil	XK-3-10	WISC	A,B,C,D,E
18	52		1	‡*Valve—exhaust	Valve outlet for exh. gases	AE-73-C	WISC	A,B,C,D,E
19	52		1	‡Valve—inlet	Admits fuel into compression chamber	AE-73-N	WISC	A,B,C,D,E
20	52		2	*Spring—valve	Return valve to closed position	AF-48	WISC	A,B,C,D,E
21	52		2	*Seat—valve spring	Retains valve spring	AG-26	WISC	A,B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

PE-108-(*)

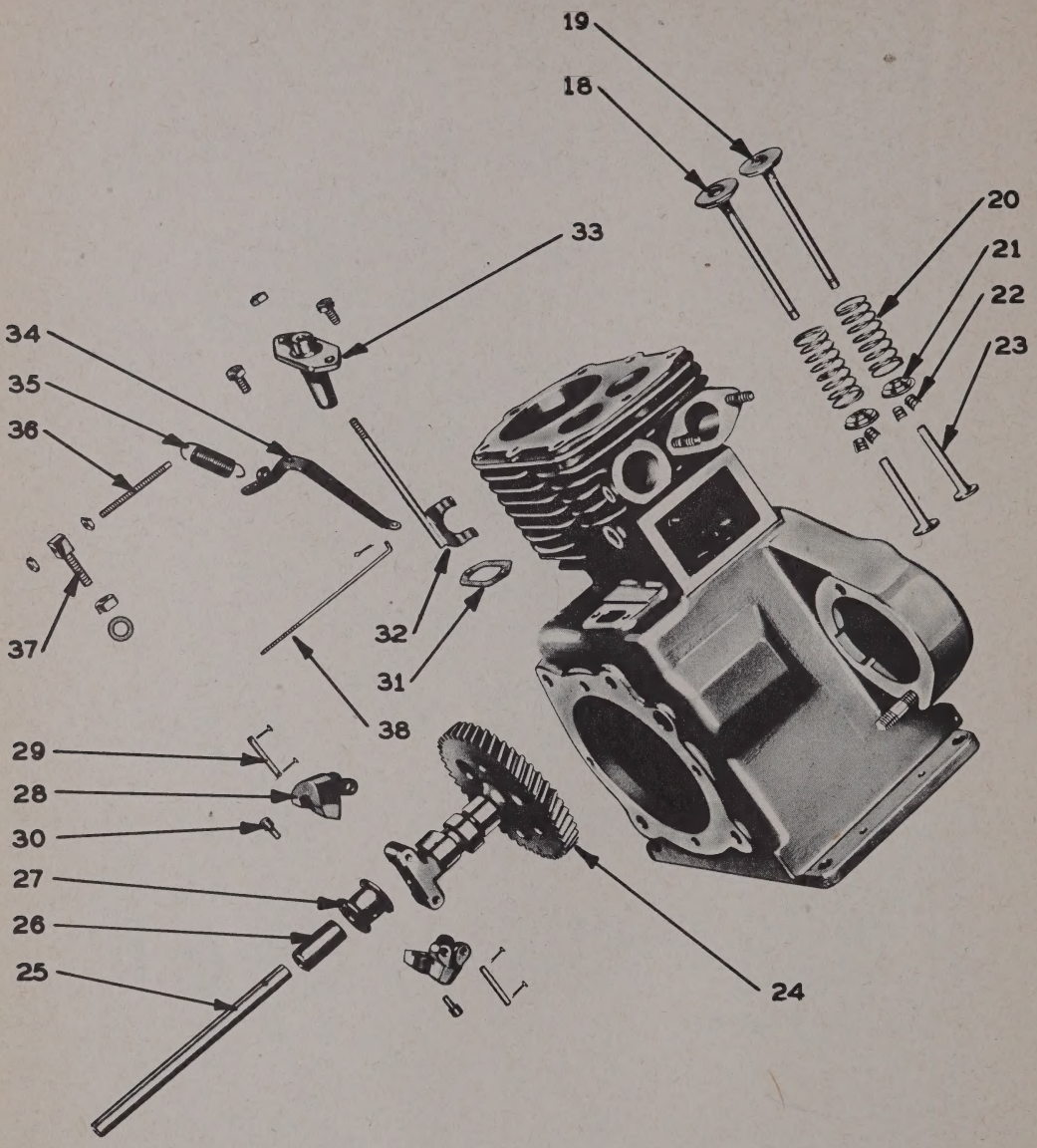

FIG 52—VALVES, GOVERNOR AND CAMSHAFT

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
22	52		2pr	*Lock—valve spring seat	Locks seat in valve	AH-9	WISC	A,B,C,D,E
23	52		2	Valve tappet	Pushes valve open	FA-42	WISC	A,B,C,D,E
24	52		1	Camshaft	Regulates intake and exhaust valve action	EA-101-A	WISC	A,B,C,D,E
25	52		1	Camshaft pin	Supports camshaft	PA-264	WISC	A,B,C,D,E
26	52		1	Governor spacer	For gov. thrust sleeve mounting	TC-321	WISC	A,B,C,D,E
27	52		1	Governor thrust sleeve	Moves gov. yoke	TC-323	WISC	A,B,C,D,E
28	52		2	Governor flyweights	Governs sleeve travel	TC-322	WISC	A,B,C,D,E
29	52		2	Governor flyweight toggle pin	Axis for gov. flyweight	PA-265	WISC	A,B,C,D,E
30	52		2	Flyweight pin	Moves governor thrust sleeve	TC-328	WISC	A,B,C,D,E
31	52		1	‡*Gasket	Gov. shaft support bracket mounting	QD-571	WISC	A,B,C,D,E
32	52		1	Governor yoke and shaft assembly	Controls governor throttle opening	TC-324-C	WISC	A,B,C,D,E
33	52		1	Gov. shaft support bracket	Guide for yoke and shaft assembly	TC-325	WISC	A,B,C,D,E
34	52		1	Control lever	Lever for control rod to carburetor	TC-332-6	WISC	A,B,C,D,E
35	52		1	*Spring—governor	Keeps carb. throttle open	PM-74	WISC	A,B,C,D,E
36	52		1	Screw—governor	Adjusting gov. spring tension	PI-121-1	WISC	A,B,C,D,E
37	52		1	Gov. spring adj. screw pin	Support for adj. screw	TC-330	WISC	A,B,C,D,E
38	52		1	Gov. control rod	Opens and closes carb. throttle	VE-304	WISC	A,B,C,D,E
39	53		1	Crankshaft assembly	To convert rotary motion	CA-51-A-8-S	WISC	A,B,C,D,E
40	53		1	‡*Connecting rod assem. (Standard)	Connecting arm between crankshaft and piston	DA-55-B-S	WISC	A,B,C,D,E
41	53		1	‡*Piston (standard)	Compresses gas vapor	DB-178-A	WISC	A,B,C,
41-A	Not illus.		1	*Piston (standard)	Compresses gas vapor	DB-177-A	WISC	D,E
41-B	Not illus.		1	*.005″ oversize piston	Compresses gas vapor	DB-178-AS5	WISC	A,B,C,
42	53		1	‡*Piston ring—comp. (Std.)	Seals compression of vapor	DC-154	WISC	A,B,C,
42-A	Not illus.		1	*.005″ oversize comp. ring	Seals compression of vapor	DC-153-S5	WISC	A,B,C,
42-B	Not illus.		1	*Piston ring—stand. compression	Seals compression of vapor	DC-155	WISC	D,E
42-C	Not illus		1	*.005 oversize comp. ring	Seals compression of vapor	DC-155-S5	WISC	D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

PE-108-(*)

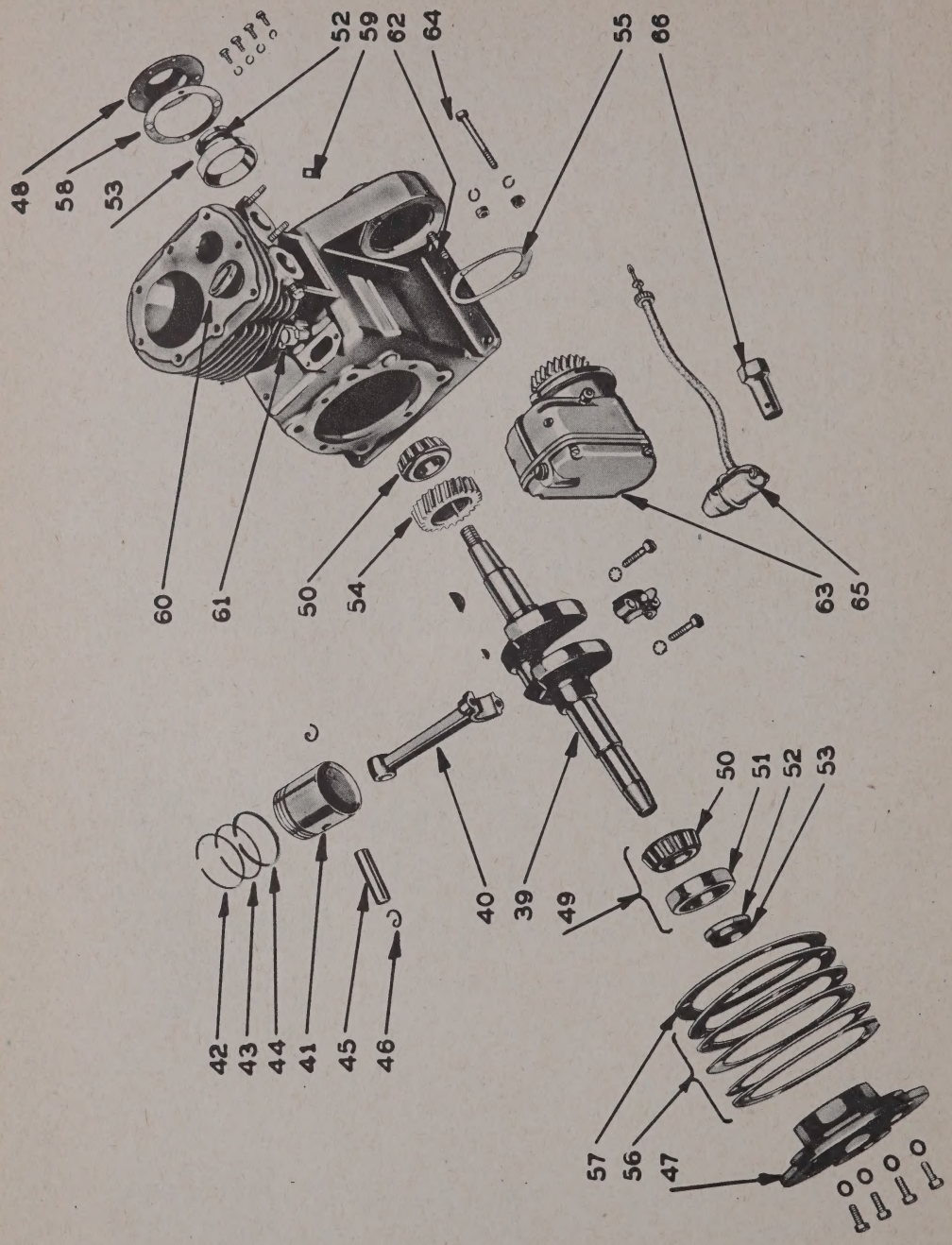

FIG. 53—BEARING, CRANKSHAFT AND PISTON

25. TABLE OF REPLACEABLE PARTS—ENGINE (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
43	53		1	*Piston ring—scraper (std.)	Seals and scrapes cylinder wall	DC-154-1	WISC	A,B,C,
43-A	Not illus.		1	*.005 oversize scraper ring	Seals and scrapes cylinder wall	DC-154-1-S5	WISC	A,B,C,
43-B	Not illus.		1	‡*Piston ring—standard scraper	Seals and scrapes cylinder wall	DC-155-1	WISC	D,E
44	53		1	‡*Piston ring—oil regulator (Std.)	Regulates oil for cylinder wall	DC-156	WISC	A,B,C,
44-A	Not illus.		1	*.005″ oversize oil ring	Regulates oil for cylinder wall	DC-156-S5	WISC	A,B,C,
44-B	Not illus.		1	*Piston ring—(Std.) oil regulator	Regulates oil for cylinder wall	DC-157	WISC	D,E
44-C	Not illus.		1	*.005″ oversize oil ring	Regulates oil for cylinder wall	DC-157-S5	WISC	D,E
45	53		1	‡Piston pin (Std.)	Connecting rod to piston mounting	DE-66	WISC	A,B,C,
				.005″ oversize piston pin	Connecting rod to piston mounting	DE-66-S5	WISC	A,B,C,
45-A	Not illus.		1	*Piston pin—standard	Connecting rod to piston mounting	DE-67	WISC	D,E
				.005″ oversize piston pin	Connecting rod to piston mounting	DE-67-S5	WISC	D,E
46	53		2	‡*Piston pin retaining ring	Retains pin in piston	PK-69	WISC	A,B,C,D,E
47	53		1	Main brg. plate (T.O. end)	Retains crankshaft bearing	BG-170	WISC	A,B,C,D,E
48	53		1	Main brg. plate (fan end)	Retains crankshaft bearing	BG-171	WISC	A,B,C,D,E
49	53		2	Main brg. assembly (Part of Req. #39)	Bearing for crankshaft	ME-88	WISC	A,B,C,D,E
50	53		2	Main bearing cone	Part of main brg.	ME-88-2	WISC	A,B,C,D,E
51	53		2	Main bearing cup	Part of main brg.	ME-88-1	WISC	A,B,C,D,E
52	53		2	Main brg. oil seal cup	Retains oil seal	PH-254	WISC	A,B,C,D,E
53	53		2	Main brg. oil seal	Prevents oil leaks around crankshaft brg.	PH-256	WISC	A,B,C,D,E
54	53		1	Crankshaft gear (Part of crankshaft assem. Ref. #39)	Drives camshaft	GA-34-A	WISC	A,B,C,D,E
55	53		1	‡*Gasket for magneto mtg.	Prevents oil from leaking out	QD-570-A	WISC	A,B,C,D,E
56	53		5	‡*Gasket—main brg. plate—.006″ thick—T.O. end	For crankshaft end play and seals plate	QD-573	WISC	A,B,C,D,E
57	53		1	‡*Gasket—main brg. plate .003″ thick—T.O. end	For crankshaft end play and seals plate	QD-573-A	WISC	A,B,C,D,E
58	53		1	‡*Gasket for brg. plate (fan end)	Seals plate against crankcase	QD-574	WISC	A,B,C,D,E
59	53		1	Breather	Relieves pressure in valve tappet compartment	PF-102	WISC	A,B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

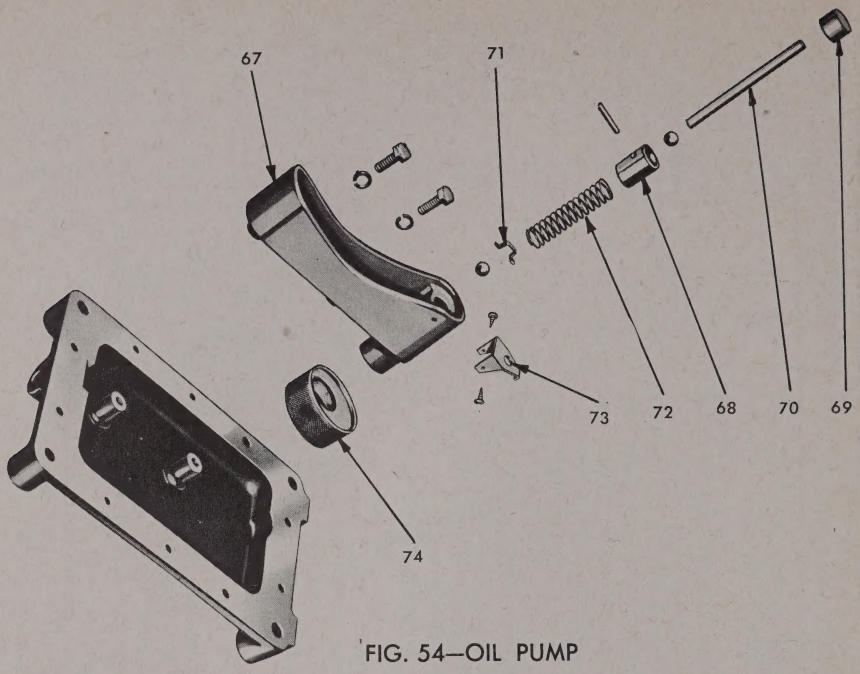

FIG. 54—OIL PUMP

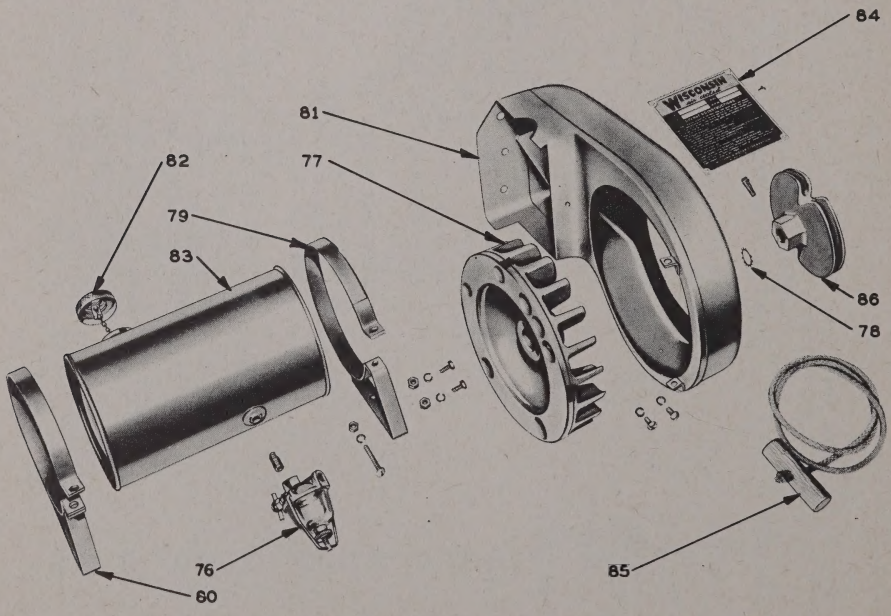

FIG. 55—FUEL TANK AND AIR SHROUDING

25. TABLE OF REPLACEABLE PARTS—ENGINE (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
60	53		1	Valve seat insert—exhaust (Part crankcase Ref. #1)	Seat for exhaust valve—can be replaced	HG-156-1	WISC	A,B,C,D,E
61	53		1	Breather assembly	Relieves crankcase pressure and prevents condensation	LO-31-A	WISC	A,B,C,D,E
62	53		1	Stud—1 3/8x5/16-24", 5/16"-18 thread (special)	Magneto mounting	PC-362-1	WISC	A,B,C,D,E
63	53		1	*Magneto	Creates spark for ignition	FMJ1B7B	FMCO	A,B,C,D,E
64	53		1	Screw—special (5/16-24x2 5/8")	Magneto mounting	PB-164	WISC	A,B,C,D,E
65	53		1	*Spark plug shield assembly	Eliminates interference with radio reception	YD-69	WISC	A,B,C,D,E
66	53		1	*Spark plug wrench	Removal of spark plug	DF-48	WISC	A,B,C,D,E
67	54		1	Body—oil pump	Oil reservoir and pump body	KA-59-B	WISC	A,B,C,D,E
68	54		1	Plunger—oil pump	Pumps oil into trough	KF-14	WISC	A,B,C,D,E
69	54		1	*Cap—plunger push rod	Guides push rod	KF-19-A	WISC	A,B,C,D,E
70	54		1	*Push rod—oil pump	Operates oil pump plunger	KF-22	WISC	A,B,C,D,E
71	54		1	*Ball retainer—oil pump	Retains lower check ball in place	PK-50	WISC	A,B,C,D,E
72	54		1	*Spring—oil pump	Creates suction stroke for plunger	PM-58	WISC	A,B,C,D,E
73	54		1	*Cover for oil pump trough	Guides oil into trough	SA-80	WISC	A,B,C,D,E
74	54		1	*Strainer—oil pump	Strains oil before entering pump	RD-107	WISC	A,B,C,D,E
76	55		1	Fuel filter	Strains gasoline	OW-418	TILO	A,B,C,D,E
76-A	Not illus.		1	*Nipple—1/8" close pipe	For mounting fuel strainer	RF-934	WISC	D,E
77	55		1	Flywheel and cooling fan	Creates uniform crankshaft motion and circulates air for cooling	NC-126	WISC	A,B,C,
77-A	Not illus.		1	Flywheel and cooling fan	Creates uniform crankshaft motion and circulates air for cooling	NC-126-D	WISC	D,E
78	55		1	Lockwasher (special)	Locks rope starter pulley	PE-57	WISC	A,B,C,D,E
79	55		1	Fuel tank strap (flywheel end)	For mtg. fuel tank	PG-186-C	WISC	A,B,C,D,E
80	55		1	Fuel tank strap (T.O. end)	For mtg. fuel tank	PG-187-B	WISC	A.B.C.
80-A	Not illus.		1	Fuel tank bracket	For mounting fuel tank	BK-71	WISC	D,E
80-B	Not illus.		2	*Fuel tank straps	For mounting fuel tank	PG-431	WISC	D,E
81	55		1	Air shroud	Directs air flow for cooling	SE-53-G	WISC	A,B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

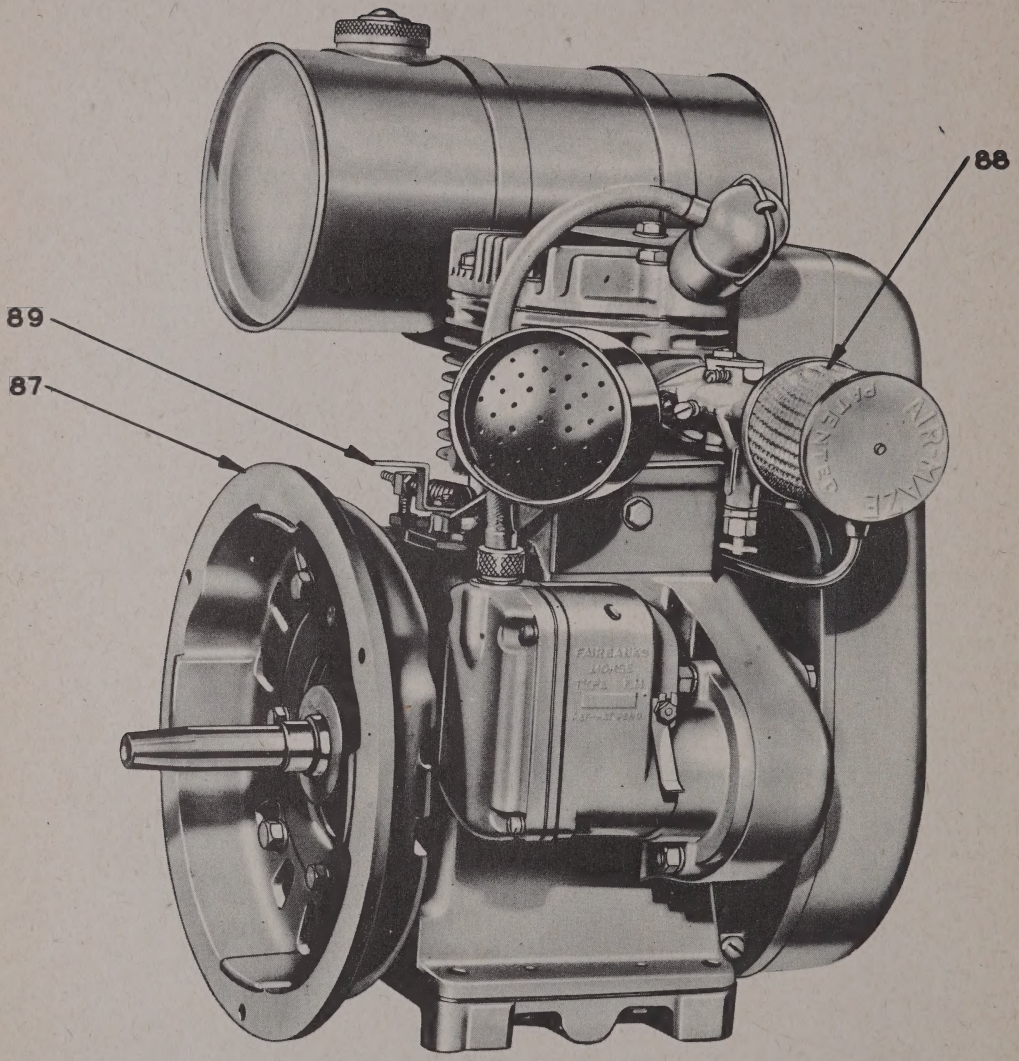

FIG. 56—COMPLETE ENGINE ASSEMBLED

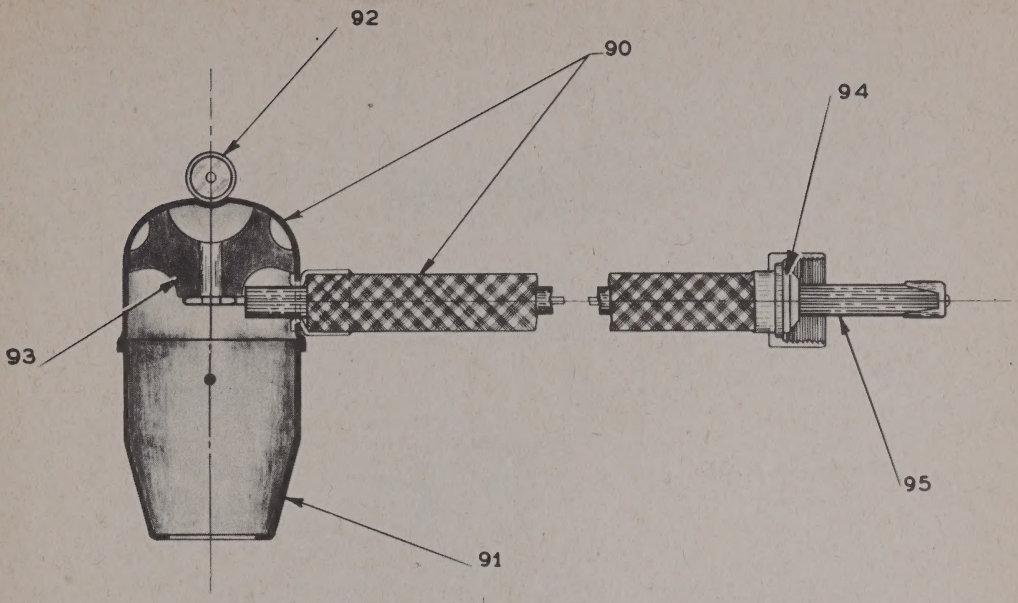

FIG. 57—SPARK PLUG RADIO SHIELD ASSEMBLY

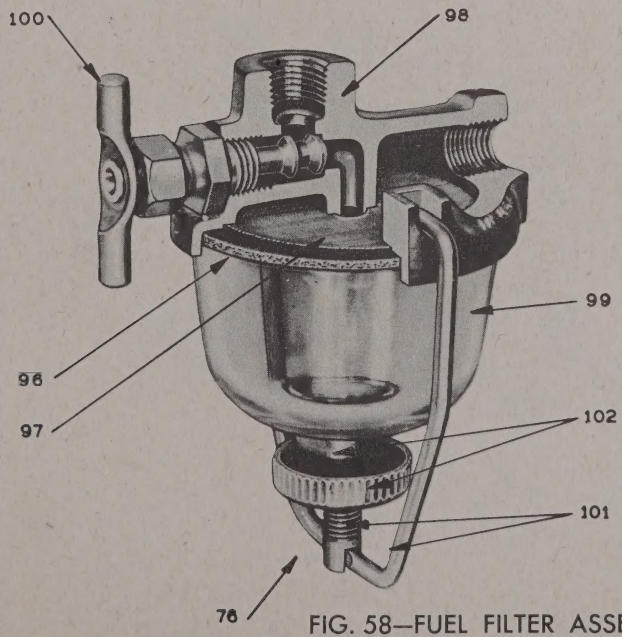

FIG. 58—FUEL FILTER ASSEMBLY

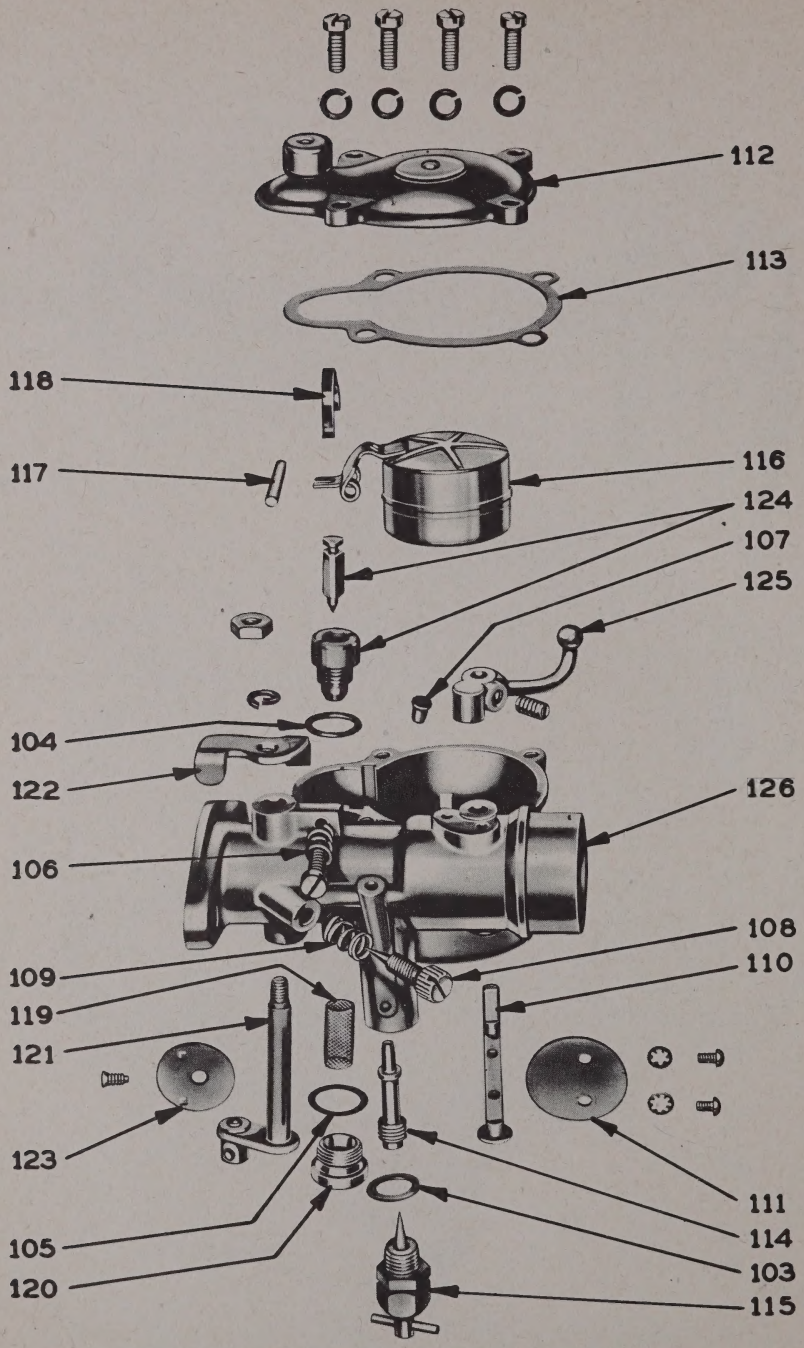

FIG. 59—CARBURETOR ASSEMBLY

25. TABLE OF REPLACEABLE PARTS—ENGINE (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
82	55		1	Fuel tank cap	Covers opening in tank	RG-87	WISC	A,B,C,D,E
83	55		1	*Fuel tank with cap	Holds gasoline to feed carburetor	WE-112-1	WISC	A,B,C,D,E
85	55		1	‡*Starting rope	For starting eng.	U-218	WISC	A,B,C,D,E
86	55		1	Sheave—start. rope	For starting eng.	UC-62-B	WISC	A,B,C,D,E
87	56		1	Generator adapter	Mounting generator	BG-205	WISC	A,B,C,D,E
88	56		1	Air filter	Filters air taken in by carburetor	OHJ	AIRM	A,B,C,
88-A	Not illus.		1	*Oil bath air filter	Filters air taken in by carburetor	#6325	UNIS	D,E
			1	Spacer for air filter bracket brace	Filters air taken in by carburetor	HF-276	WISC	D,E
			1	Brace—air filter bracket to case	Filters air taken in by carburetor	PG-287	WISC	D,E
89	56		1	Lever	For solenoid control	TC-406	WISC	A,B,C,D,E
90	57		1	Spark plug cap assem.	Part of YD-69 spark plug shield assem.	YD-69-S	WISC	A,B,C,D,E
91	57		1	Body for spark plug shield	Part of YD-69 spark plug shield assem.	YD-70	WISC	A,B,C,D,E,
92	57		1	Ball assembly	Retains spark plug shield cap and body	PK-88	WISC	A,B,C,D,E
93	57		1	Terminal tension cap	Retains ignition terminal to spark plug	YD-73	WISC	A,B,C,D,E
94	57		1	Packing ring	Retains ignition wire in shield	YD-78	WISC	A,B,C,D,E
95	57		1	Ignition wire assembly	Conducts spark from magneto to plug	YL-84	WISC	A,B,C,D,E
96	58		1	‡*Fuel filter gasket	For sealing fuel strainer bowl to cover	OW-222	TILO	A,B,C,D,E
97	58		1	*Fuel filter strainer	Strains fuel	OW-352	TILO	A,B,C,D,E
98	58			*Fuel filter cover	Main body	OW-355	TILO	A,B,C,D,E
99	58		1	*Fuel filter glass bowl	Fuel container	OW-363	TILO	A,B,C,D,E
100	58		1	Shut-off cock	Shuts off gas supply from tank	OW-432	TILO	A,B,C,D,E
101	58		1	Clamp wire and stud	Glass support to body	OW-446	TILO	A,B,C,D,E
102	58		1	Thumb nut and cup	Locks filter cup to body	OW-462	TILO	A,B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

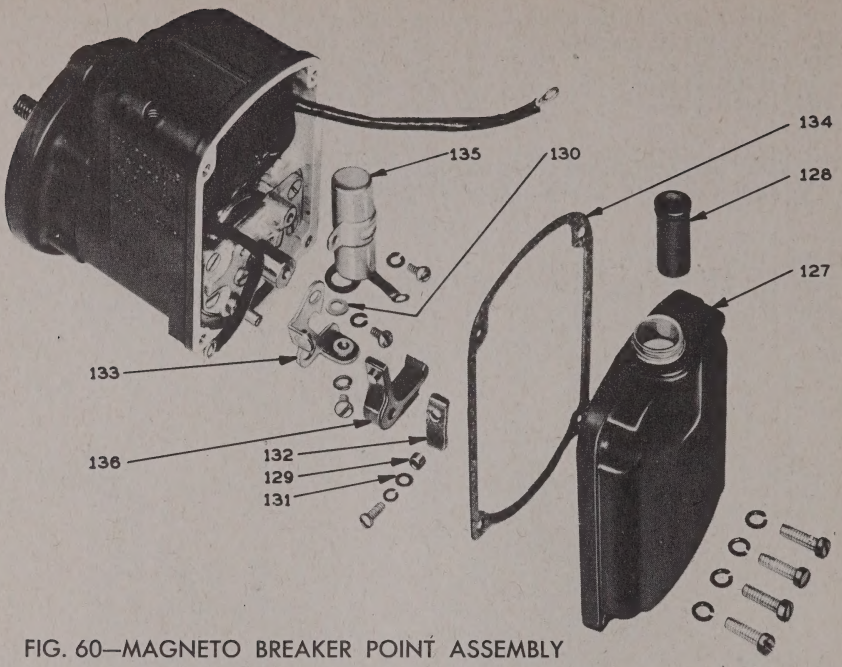

FIG. 60—MAGNETO BREAKER POINT ASSEMBLY

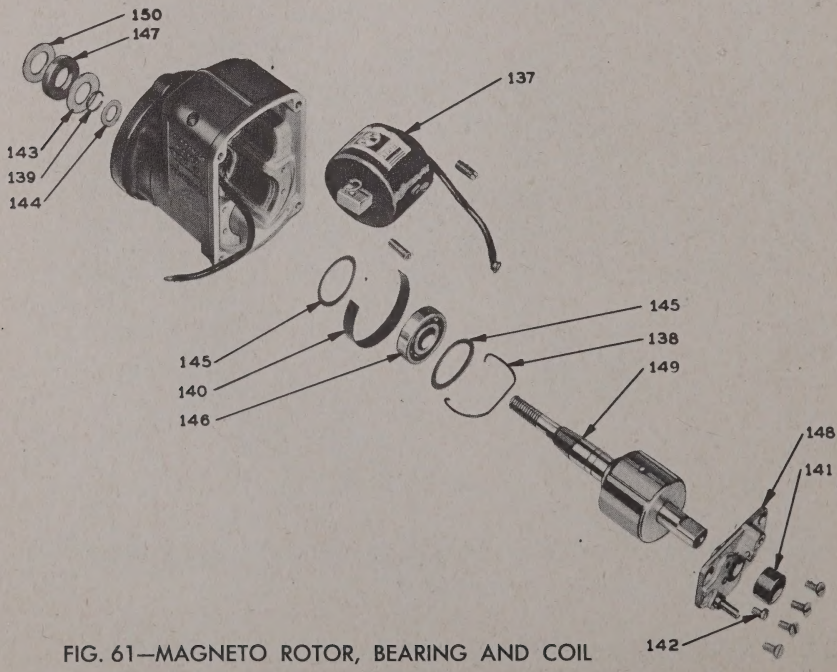

FIG. 61—MAGNETO ROTOR, BEARING AND COIL

26. TABLE OF REPLACEABLE PARTS—CARBURETOR

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
103	59		1	‡*Gasket for main discharge jet	Seat jet mounting	P-9600	STRO	A,B,C,D,E
104	59		1	Float needle valve seat gasket	Seal needle valve seat mounting	P-11572	STRO	A,B,C,D,E
105	59		1	*Gas strainer plug gasket	Seal strainer plug mounting	P-14364	STRO	A,B,C,D,E
106	59		1	Idle adjustment spring	Tension for adj. screw	P-15301	STRO	A,B,C,D,E
107	59		1	Plug for idle discharge hole	Plugs chamber	P-15458	STRO	A,B,C,D,E
108	59		1	Idle needle valve	Meters fuel at idling speed	P-15478	STRO	A,B,C,D,E
109	59		1	Idle needle valve spring	Retains needle valve in place	P-18710	STRO	A,B,C,D,E
110	59		1	Choke stem and lever	Controls carb. choke valve	P-22323	STRO	A,B,C,D,E
111	59		1	Choke valve	Choke motor for starting	P-22969	STRO	A,B,C,D,E
112	59		1	Float chamber cover	Covers float chamber	P-23572	STRO	A,B,C,D,E
113	59		1	‡*Gasket for chamber cover	Seals chamber cover to carburetor body	P-23574	STRO	A,B,C,D,E
114	59		1	Main discharge jet	Meters fuel	P-23575	STRO	A,B,C,D,E
115	59		1	Metering jet	Adjusts fuel to discharge jet	P-23576	STRO	A,B,C,D,E
116	59		1	Float	Controls fuel level in carburetor	P-23579	STRO	A,B,C,D,E
117	59		1	*Fulcrum pin for float	Axis for float	P-23583	STRO	A,B,C,D,E
118	59		1	*Fulcrum pin spring	Controls tension to float	P-23584	STRO	A,B,C,D,E
119	59		1	Strainer	Strains fuel	P-23586	STRO	A,B,C,D,E
120	59		1	Fuel strainer plug	Retains fuel strainer in place	P-23587	STRO	A,B,C,D,E
121	59		1	Throttle lever and stem	Controls throttle valve	P-23588	STRO	A,B,C,D,E
122	59		1	Throttle stop	Holds throttle lever and stem in place	P-23593	STRO	A,B,C,D,E
123	59		1	Throttle valve	Controls volume of gas vapor to engine	P-23594	STRO	A,B,C,D,E
124	59		1	Float needle valve and seat	Controls flow of fuel into carb. bowl	P-23639	STRO	A,B,C,D,E
125	59		1	Choke lever	Controls carb. choke valve	P-23841	STRO	A,B,C,D,E
126	59		1	Main Body	Fuel chamber	382322	STRO	A,B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

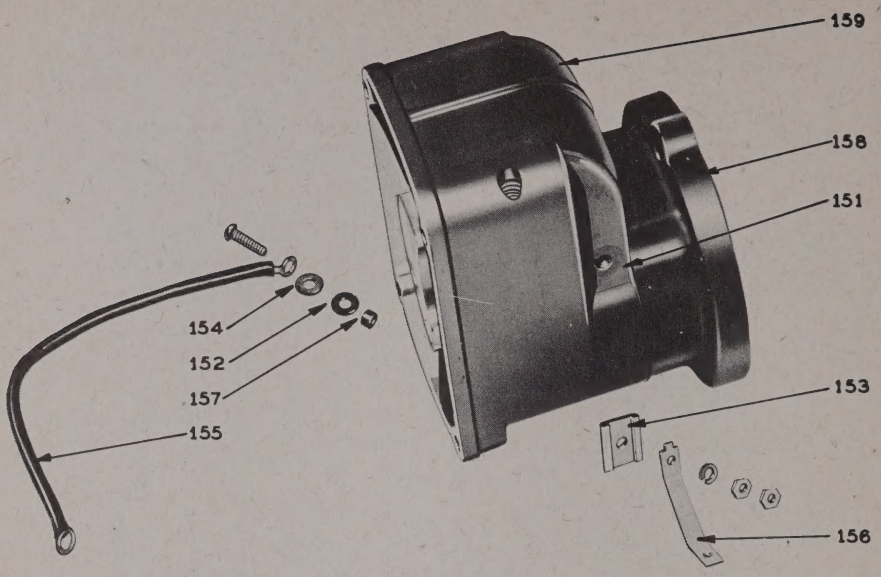

FIG. 62—MAGNETO GROUND SWITCH ASSEMBLY

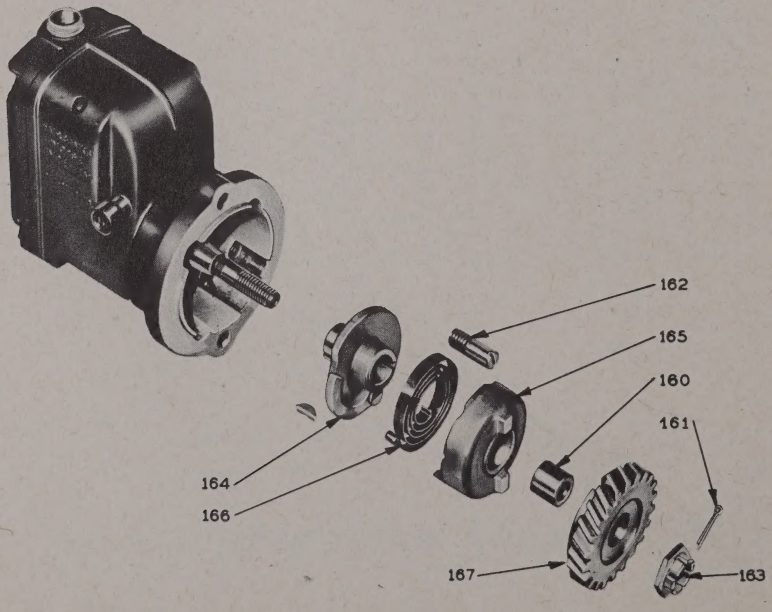

FIG. 63—MAGNETO IMPULSE COUPLING ASSEMBLY

27. TABLE OF REPLACEABLE PARTS—MAGNETO

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
127	60		1	Magneto end cover	Closes housing mounts cable outlet	A2430-A	FMCO	A,B,C,D,E
128	60		1	Cable outlet	Provides for connection of cable	A2474-E	FMCO	A,B,C,D,E
129	60		1	Cam felt wick spacer	Prevents felt wick screw from tightening	A2982	FMCO	A,B,C,D,E
130	60		1	Stationary contact arm washer	Locks stationary point in position	B5969	FMCO	A,B,C,D,E
131	60		1	Rotor felt wick washer	Supports cam felt wick	C6503	FMCO	A,B,C,D,E
132	60		1	Cam felt wick	Lubricates surface of cam	E2788	FMCO	A,B,C,D,E
133	60		1	Stationary arm with breaker point	Provides adjustment of contact point gap	62454	FMCO	A,B,C,D,E
134	60		1	‡*Magneto end cover gasket	Seals end cap and frame	H2498	FMCO	A,B,C,D,E
135	60		1	Condenser assembly	Prevents excessive arcing	M2433	FMCO	A,B,C,D,E
136	60		1	‡*Breaker arm with bracket and points	Establishes and breaks primary circuit	R2437	FMCO	A,B,C,D,E
137	61		1	Coil assembly	Transfers low voltage to high voltage	A2477A	FMCO	A,B,C,D,E
138	61		1	Rotor bearing snap ring	Retains ball bearing in frame	B1498B	FMCO	A,B,C,D,E
139	61		1	Rotor shaft snap ring	Retains ball brg. on shaft	B1498D	FMCO	A,B,C,D,E
140	61		1	Brg. insulation strip	Insulates ball brg. from frame	B2824	FMCO	A,B,C,D,E
141	61		1	Rotor shaft oilite bearing	Bearing for rotor	B5950A	FMCO	A,B,C,D,E
142	61		1	Stationary contact—arm eccentric head adjusting screw	Turning screw changes contact point gap	C2455	FMCO	A,B,C,D,E
143	61		1	Innter retaining washer	Inner closure of bearing seal	C2492	FMCO	A,B,C,D,E
144	61		1	Rotor shaft thrust brg. shim	Tightens rotor snap ring	C2723	FMCO	A,B,C,D,E
145	61		2	Brg. insulating washer	Insulates bearing from frame	C2493	FMCO	A,B,C,D,E
146	61		1	Rotor shaft ball bearing	Bearing for drive end of rotor	C5949	FMCO	A,B,C,D,E
147	61		1	Bearing seal washer	Seals drive end ball bearing	G3861	FMCO	A,B,C,D,E
148	61		1	Bearing and breaker support plate	Support for points condenser and end brg.	H4361	FMCO	A,B,C,D,E
149	61		1	Magnetic rotor	Magnetizes laminations assembly	JX2480	FMCO	A,B,C,D,E
150	61		1	Outer retaining washer	Outer closure of bearing seal	A2492A	FMCO	A,B,C,D,E
151	62		1	Demountable flange plate gasket	Seals flange to frame	A2837	FMCO	A,B,C,D,E
152	62		1	Insulating washer	Insulates ground screw from frame	B6018	FMCO	A,B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

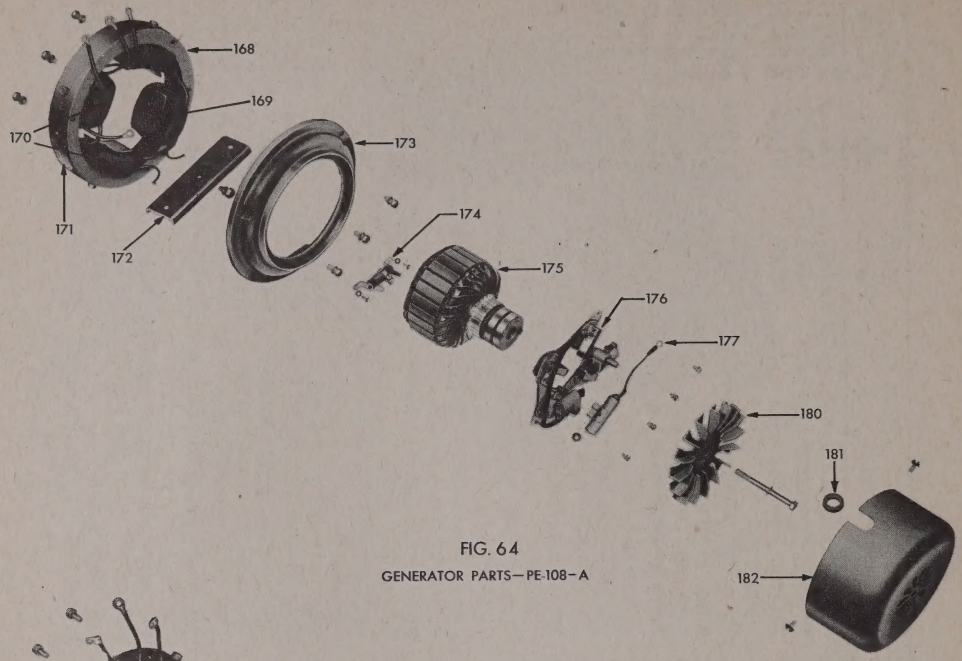

FIG. 64
GENERATOR PARTS—PE-108-A

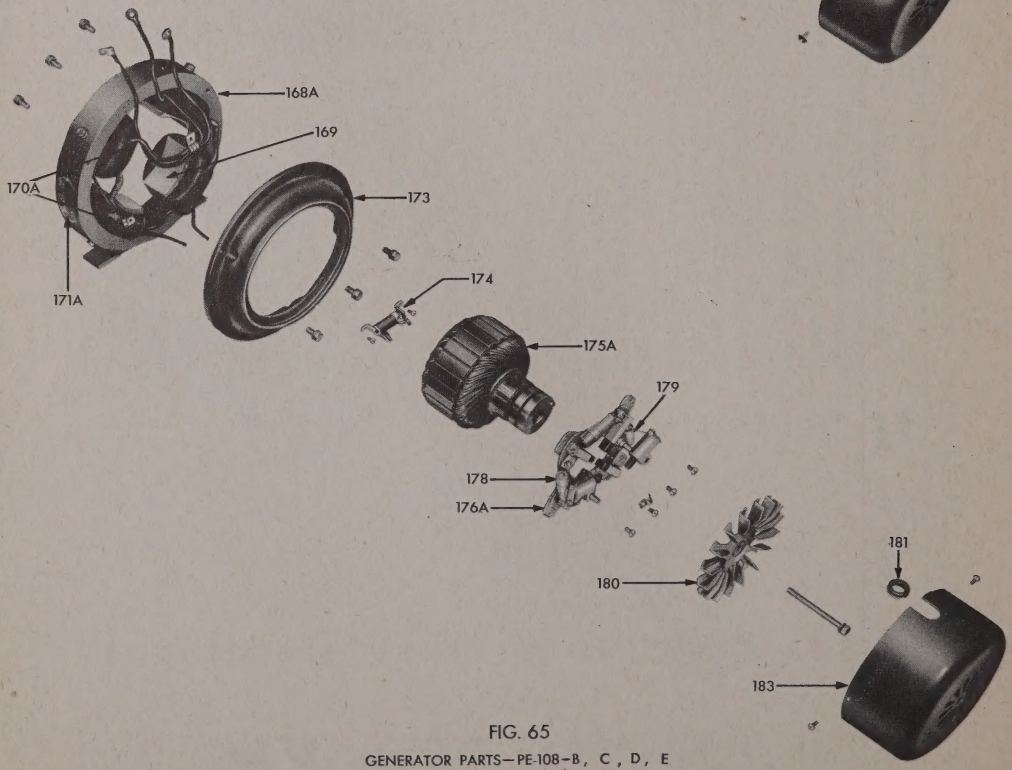

FIG. 65
GENERATOR PARTS—PE-108-B, C, D, E

27. TABLE OF REPLACEABLE PARTS—MAGNETO (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
153	62		1	Ground screw insulating block	Insulates ground screw from frame	C6018A	FMCO	A,B,C,D,E
154	62		1	Spacing washer	Prevents binding of ground screw	D2458	FMCO	A,B,C,D,E
155	62		1	Primary ground wire assembly	Breaker to ground switch connection	D2499A	FMCO	A,B,C,D,E
156	62		1	Ground switch lever	Ground lever to stop engine	D2514	FMCO	A,B,C,D,E
157	62		1	Ground screw bushing	Insulates ground screw from frame	E2457A	FMCO	A,B,C,D,E
158	62		1	Demountable flange plate	Mounts frame to plate	E2561	FMCO	A,B,C,D,E
159	62		1	Frame	Main body with laminations	JX2425	FMCO	A,B,C,D,E
160	63		1	Coupling gear bushing	Correct mtg. of drive gear on shaft	A2572	FMCO	A,B,C,D,E
161	63		1	Coupling nut pin	Locks impulse coupling nut on shaft	A-5931A	FMCO	A,B,C,D,E
162	63		1	Coupling pawl stop pin	Strikes stop pin at low speeds	K2568	FMCO	A,B,C,D,E
163	63		1	Impulse coupling nut	Holds impulse coupling on shaft	M2570	FMCO	A,B,C,D,E
164	63		1	Impulse coupling hub assembly	Mounts pawls which stop rotor movement	V2563	FMCO	A,B,C,D,E
165	63		1	Impulse coupling shell	Houses impulse coupling hub	25957	FMCO	A,B,C,D,E
166	63		1	Impulse coupling drive spring	Provides impulse action	D2565	FMCO	A,B,C,D,E
167	63		1	Magneto gear	Drives magneto	GD-87B	WISC	A,B,C,D,E

28. TABLE OF REPLACEABLE PARTS—GENERATOR

168	64		1	Field Frame	Path for Mag. Current	P-4145-2	PGEN	A,
168-A	65		1	*Field Frame and Support	Path for Mag. Current	AS-C-10854	PGEN	B,C,D,E
169	64, 65		4	*Pole Shoe Assembly	For distributing mag. flux.	AS-A-10976	PGEN	A,B,C,D,E
170	64		1	*Field Coil Assembly	Carries current for magnetic field	AS-D-9547	PGEN	A,B,C,D,E
170-A	65		1	Field Coil Assembly	Carries current for magnetic field	AS-C-10798	PGEN	
171	64		1	Name Plate (Gen.) 1980-Chi-42	For identifying unit by elect. data	A-1237	PGEN	A,
171A	65		1	Nameplate 4791-Phila-43	For identifying unit by elect. data	A-10905	PGEN	C,
172	64		1	Generator Support	For mounting Gen. to Lord Mounts	A-9817	PGEN	A,
173	64, 65		1	*End Bracket	For supporting Brush Holder Yoke Assembly	P-4138-2	PGEN	A,B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

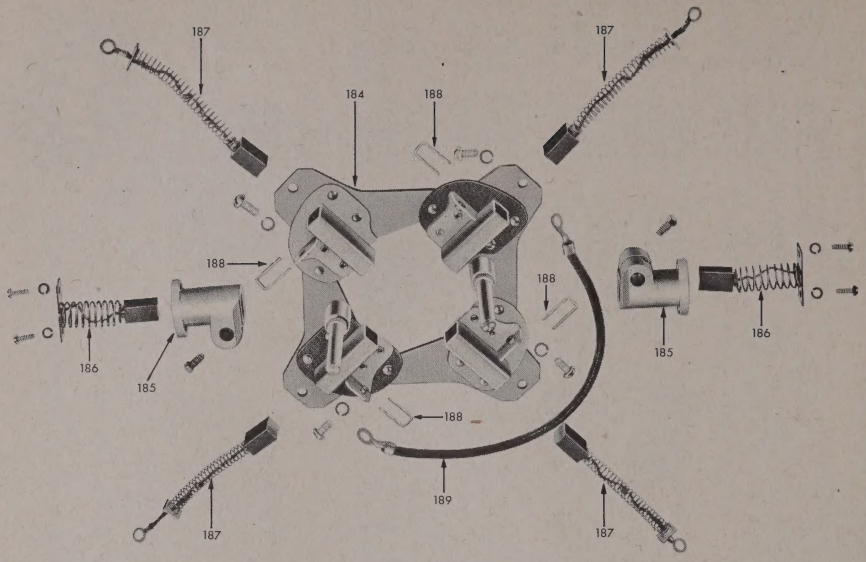

FIG. 66

BRUSH-HOLDER ASSEMBLY PARTS—PE-108—A

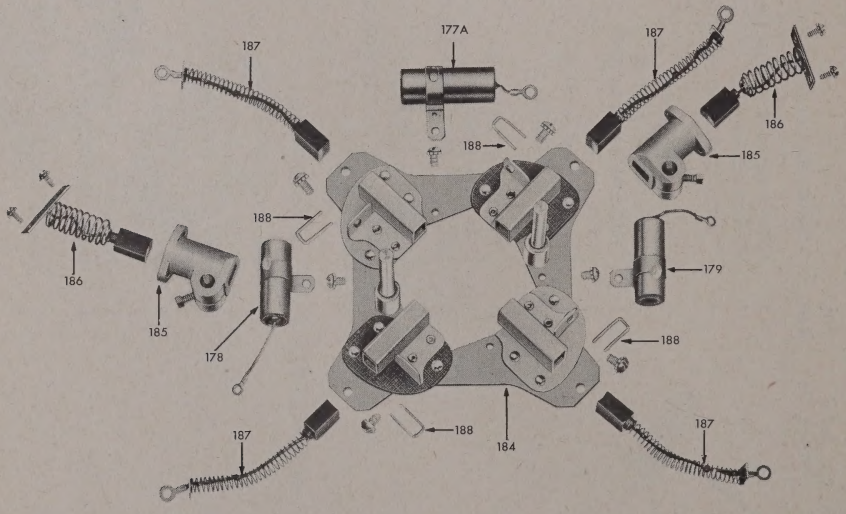

FIG. 67

BRUSH-HOLDER ASSEMBLY PARTS—PE-108—B, C

28. TABLE OF REPLACEABLE PARTS—GENERATOR (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
174	64, 65		1	*Resistor	To regulate Field current	#0360	OHME	A,B,C,D,E
175	64		1	*Armature	Cuts magnetic field	AS-B-11011	PGEN	A,
175-A	65		1	*Armature	Cuts magnetic field	AS-B-9666	PGEN	B,C,D,E
176	64		1	*Brush Holder Yoke Assembly	For holding A-C and D-C brushes	G-2830	PGEN	A
176-A	65		1	*Brush Holder Yoke Assembly	For holding A-C and D-C brushes	AS-C-10796-1	PGEN	B,C,D,E
177	64		1	*Condensers	For minimizing spark at D-C brushes	#7651	INDS	A,
177-A	65, 67		1	*Condensers	For minimizing spark at D-C brushes	X-5476	FAST	B,C,D,E
178	65, 67		1	*Condensers	For minimizing spark at A-C brushes	X-5475	FAST	B,C,D,E
179	65, 67		1	*Condensers	For minimizing spark at A-C Brushes	X-5475	FAST	B,C,D,E
180	64, 65		1	*Fan and Bushing Assembly	For cooling arm. and Field	AS-B-1C949	PGEN	A,B,C,D,E
181			2	*Grommet	1–used in end cover to insulate gen. 1–used to insulate lead in control leads box	#873	ATLC	A,B,C,D,E
182	64		1	*End Cover	For housing fan and brush rigging	P-3977	PGEN	A,
183	65		1	*End Cover	For housing fan and brush rigging	P-3977-1	PGEN	B,C
183-A	Not illus.		1	*End Cover	For housing fan and brush rigging	C-11328	PGEN	D,E
184	66, 67		1	*Brush Holder Bkt. Assembly	For holding A-C and D-C brushes		PGEN	A,B,C,D,E
185	66, 67		2	*Brush Holders (A-C)	To hold A-C brushes	B-2517	PGEN	A,B,C,D,E
186	66, 67		2	‡*Brush and Spring assembly (A-C) M-5	To take off A-C current	AS-9533	PGEN	A,B,C,D,E
187	66, 67		4	‡*Brush and Spring assembly (D-C) M-5	To take off D-C current	G-2893	PGEN	A,B,C,D,E
188	66, 67		4	*Staples	To hold D-C brushes in holders	A-1886	PGEN	A,B,C,D,E
189	66, 67		1	*Jumper assembly	To carry D-C current from one brush to another	AS-B-10112-10	PGEN	A
190	Not illus.		1	*Clamp	To clamp field lead to brush holder yoke	28905-4-199	TINN	B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

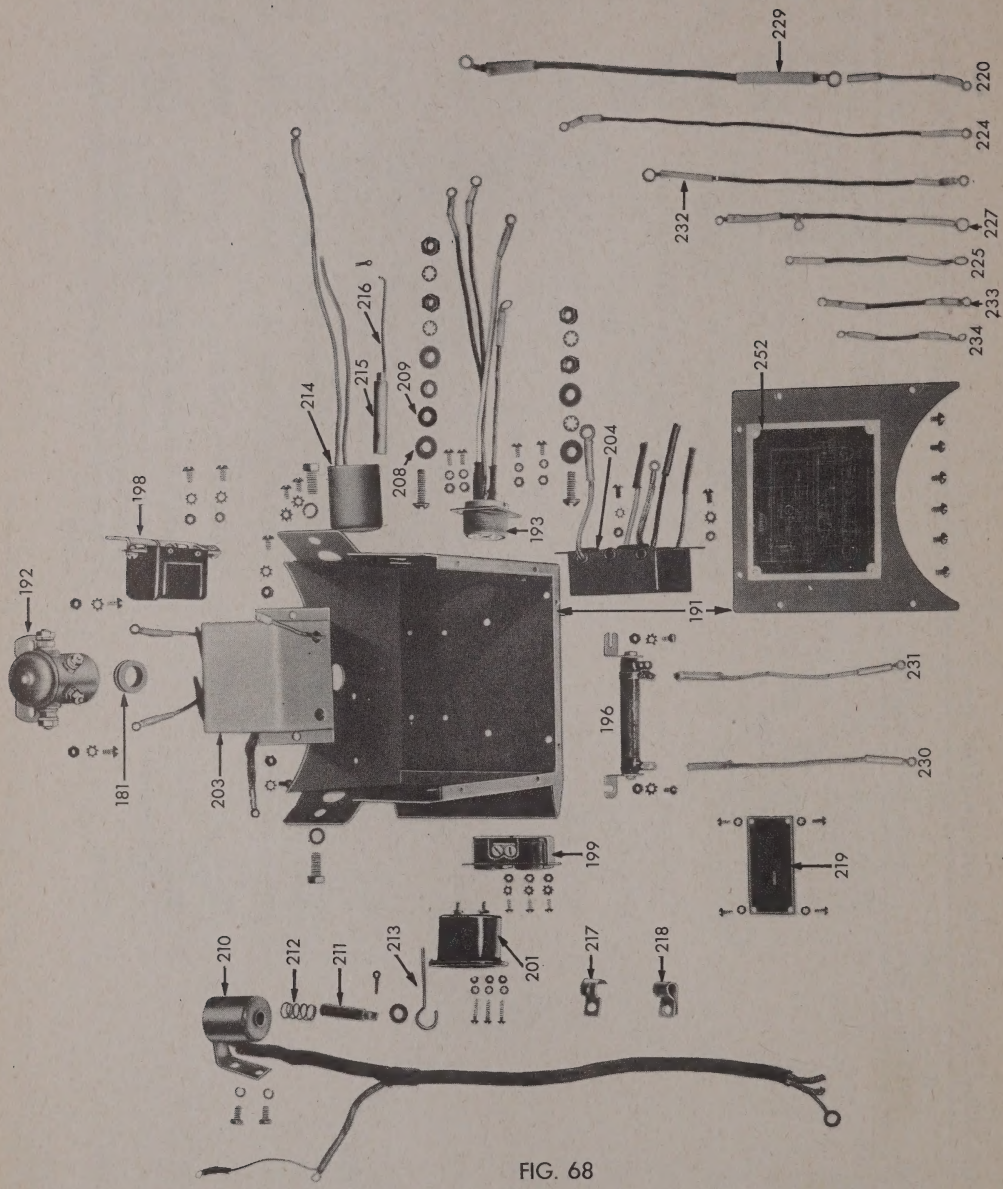

FIG. 68

CONTROL BOX PARTS—PE-108-A

29. TABLE OF REPLACEABLE PARTS—CONTROL BOX

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
191	68		1	Control Box and Cover	Housing for all Control equipment	D-9848	PGEN	A,
191-A	69		1	Control Box and Cover	Housing for all Control equipment	D-10740	PGEN	B,C,
191-B	Not illus.		1	Control Box and Cover	Housing for all Control equipment	D-11297	PGEN	D,
191-C	Not illus.		1	Control Box and Cover	Housing for all Control equipment	D-11329	PGEN	E
192	68		1	‡Relay (12 V. D-C)	Relays battery current for starting unit	Type 70	RBMC	A,
192-A	69		1	*Relay (12 V. D-C)	Relays battery current for starting unit	#2242	RBMC	B,C,D,E
193	68, 69		1	*Amphenol Receptacle	For connecting remote control leads	AN-3102-24-2S	AMCO	A,B,C,D,E
194	Not illus.		1	*Circuit Breaker	To prevent overload on A-C line	C-6363-2-6	SPEN	D,E
195	Not illus.		1	*Switch 2 Pole Double Thr.	To switch from low charge, to high charge	#8824-K2	CUTL	E
196	68, 69		1	*Resistor 50 W. 2 ohms	For regulating gen. current	#0560-B	OHME	A,B,C
196-A	Not illus.		1	*Resistor 50 W. 1.2 ohms	For regulating gen. current	B-11331	LECT	E
197	Not illus.		1	*Resistor 100 W. –2 ohms	For regulating gen. current	#0956-B	OHME	D
197-A	Not illus.		1	*Resistor 100 W. .28 ohms	For ergulating gen. current	B-11332	LECT	E
198	68		1	‡Cutout (12 V.)	To prevent battery from discharging into gen.	EC-43-A	ELEC	A,
199	68, 69		1	*Receptacle	For A-C current outlet	#9200	HUBL	A,B,C,D,E
200	Not illus.		1	*Push Button	To start unit electrically at control box	#9800-K46	CUTL	E
201	68, 69		1	‡*Voltmeter 0-150 V (A-C)	For checking (A-C) output of gen.	AW-41 9xc546	GECO	A,B,C,D,E
202	Not illus.		1	‡*Ammeter 20-o-20 (D-C)	For checking D-C charge and discharge amps.	#7020	STER	D,E
203	68		1	A-C filter assembly	For eliminating raido interference in (A-C) line	AS-9576	PGEN	A,
204	68		1	(D-C) filter assembly	For eliminating radio interference in (A-C) line	AS-9577	PGEN	A,
205	69		1	*(A-C and D-C filter assembly)	For eliminating radio interference in gen.	AS-C-10754	PGEN	B,C

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

PE-108-(*)

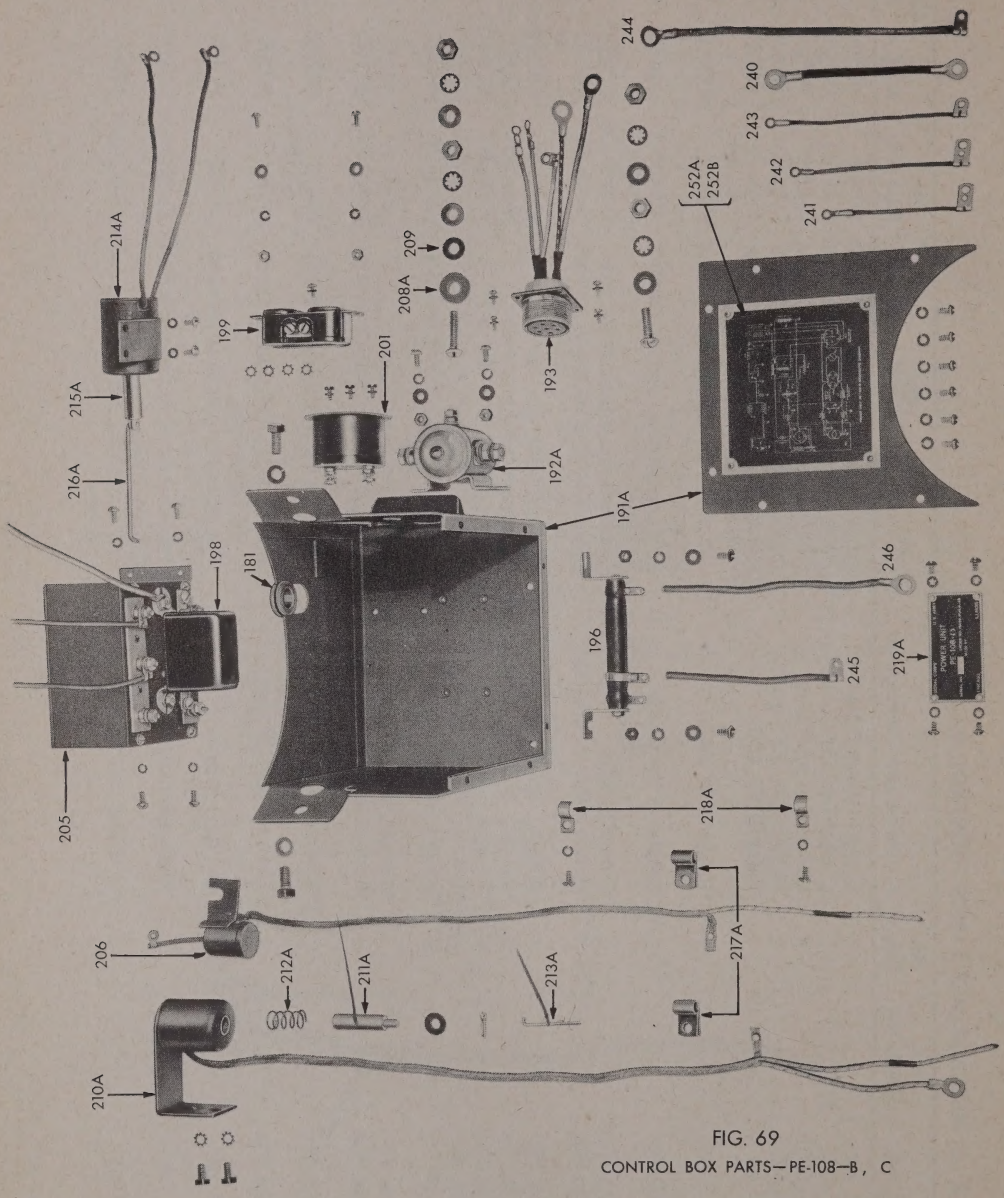

FIG. 69
CONTROL BOX PARTS—PE-108—B, C

29. TABLE OF REPLACEABLE PARTS—CONTROL BOX (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
206	69		1	Magneto Filter assembly	For eliminating radio interference in gen.	AS-C-10744	PGEN	B,C,D,E
207	Not illus.		1	*A-C and D-C filter assembly	For eliminating radio interference in gen.	AS-C-10754-1	PGEN	D
207-A	Not illus.		1	*A-C and D-C filter assembly	For eliminating radio interference in gen.	AS-C-10754-2	PGEN	E
208	68		1	Fibre Shoulder Washer	For insulating pos. bat. term. from control box	A-9572	PGEN	A,
208-A	69		1	Fibre Shoulder Washer	For insulating pos. bat. term. from control box	A-10829	PGEN	B,C,D,E
209	68, 69		1	Washer (Black Fibre)	For insulating pos. bat. term. from control box	9573	PGEN	A,B,C,D,E
210	68		1	Automatic choke ass'y. (coil and bracket only)	For operating engine choke by remote control	AS-9526	PGEN	A,
210-A	69		1	Automatic choke ass'y.(coil and bracket only)	For operating engine choke by remote control	AS-C-10802	PGEN	B,C,D,E
211	68		1	Solenoid Plunger	Chokes engine	9601	PGEN	A,
211-A	69		1	Solenoid Plunger	Chokes engine	C-10802-3	PGEN	B,C,D,E
212	68		1	Spring	Returns automatic choke plunger to open pos.	9608	PGEN	A,
212	68		1	Spring	Returns automatic choke plunger to open pos.	C-10802-4	PGEN	B,C,D,E
213	68		1	Control Rod	Connects auto. choke plunger to engine choke	9607	PGEN	A,
213-A	69		1	Control Rod	Connects auto. choke plunger to engine choke	C-10802-5	PGEN	B,C,D,E
214	68		1	Voltage Regulator	Regulates voltage from no load to full load	AS-9527	PGEN	A
214-A	69		1	Voltage Regulator	Regulates voltage from no load to full load	AS-C-10755	PGEN	B,C,D,E
215	68		1	Solenoid Plunger	Pulling member of voltage regulator	9604	PGEN	A,

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

29. TABLE OF REPLACEABLE PARTS—CONTROL BOX (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
215-A	69		1	Solenoid Plunger	Pulling member of voltage regulator	C-10755-2	PGEN	B,C,D,E
216	68		1	Control Rod	For connecting voltage regulator to throttle arm linkage	9591	PGEN	A,
216-A	69		1	Control Rod	For connecting voltage regulator for throttle arm linkage	C-10755-7	PGEN	B,C,D,E
217	68		1	Wire Clamp	For holding choke leads to control Box	A-9558	PGEN	A,
217-A	69		1	Wire Clamp	For holding choke leads to control box	A-9558	PGEN	B,C,D,E
218	68		1	Wire Clamp	For holding choke leads to control box	9559	PGEN	A,
218-A	69		2	Wire Clamp	For holding choke leads to control box	#657	STEW	B,C,D,E
219	68		2	Nameplate (S.C.) 1980-Chi-42	For identifying equipment	9519	HALI	A,
219-A	69		1	Nameplate 15537-Phila-43	For identifying equipment	B-6484	ERLA	C,
220	68		1	Lead and Lug assembly	For connecting A-C meter to A-C socket	AS-B-10114-20	PGEN	A,
221	Not illus.		2	Lead and Lug assembly	1–for connecting A-C socket to "F" on Recep.	AS-B-10114-21	PGEN	A,
				Lead and Lug assembly	1–For connecting A-C socket to "A" on Recep.			
222	Not illus.		1	Lead and Lug assembly	For connecting center relay term. to E on Rec.	AS-B-10114-22	PGEN	A,
223	Not illus.		1	Lead and Lug assembly	For connecting volt. reg. to A-C socket	AS-B-10114-23	PGEN	A,
224	68		1	Lead and Lug assembly	For connecting minus bat. term. to D-C brush hold	AS-B-10114-24	PGEN	A
225	68		1	Lead and Lug assembly	For connecting minus bat. term. to cutout ground	AS-B-10114-25	PGEN	A
226	Not illus.		1	Lead and Lug assembly	For connecting + bat. term. to choke	AS-9610	PGEN	A

PE-108-(*)

*Supplied as depot spares.
‡Supplied as running spares in tool box.
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29. TABLE OF REPLACEABLE PARTS—CONTROL BOX (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
227	68		1	Lead and Lug assembly	For connecting (A-C) filter to −bat. term.	AS-9611	PGEN	A
228	Not illus.		1	Lead and Lug assembly	For connecting −bat. term. to "D" on recep.	AS-B-10114-14	PGEN	A
229	68		1	Lead and Lug assembly	For connecting +battery term. to start relay	AS-B-10110-1	PGEN	A
230	68		1	Lead and Lug assembly	For connecting +battery term. to resistor	AS-B-10114-15	PGEN	A
231	68		1	Lead and Lug assembly	For connecting cutout to resistor	AS-B-10114	PGEN	A
232	68		1	Lead and Lug assembly	For connecting cutout to D-C filter	AS-B-10114-17	PGEN	A
233	68		1	Lead & Lug Assembly	For connecting right to left term. of relay	AS-B-10114-18	PGEN	A
234	68		1	Lead & Lug Assembly	For connecting (AC) meter to AC recep.	AS-B-10114-19	PGEN	A
235	Not illus.		1	Lead & Lug Assembly	From "A" on amphenol recep. to top of AC recep.	AS-B-10116-56	PGEN	B,C,D,E
236	Not illus.		1	Lead & Lug Assembly	From "C" on amphenol recep. to relay	AS-B-10116-40	PGEN	B,C,D,E
237	Not illus.		1	Lead & Lug Assembly	From "D" on amphenol recep. to −bat. term.	AS-B-10114-26	PGEN	B,C,D,E
238	Not illus.		1	Lead & Lug Assembly	From "E" on amphenol recep. to relay	AS-B-10116-44	PGEN	B,C,D,E
239	Not illus.		1	Lead & Lug Assembly	From "F" on amphenol recep. to (AC) recept.	AS-B-10116-57	PGEN	B,C,D,E
240	69		1	Lead & Lug Assembly	From +Bat. to start relay	AS-B-10109-1	PGEN	B,C,D,E
241	69		1	Lead & Lug Assembly	From bottom of AC plug to voltmeter	AS-B-10116-51	PGEN	B,C,D,E
242	69		1	Lead & Lug Assembly	From top of AC plug to voltmeter	AS-B-10116-52	PGEN	B,C,D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
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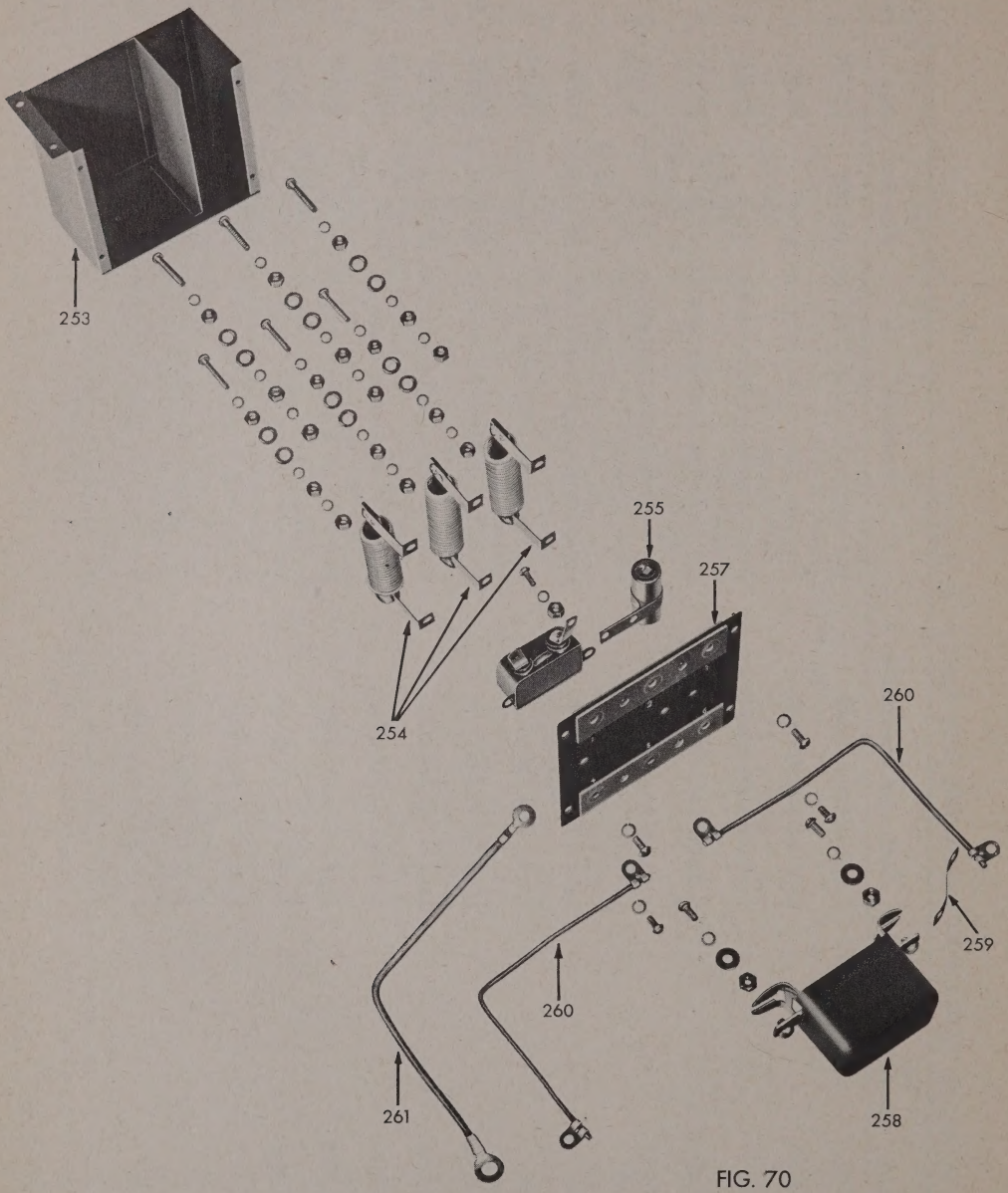

FIG. 70

FILTER PARTS—PE-108-B, C, D, E

29. TABLE OF REPLACEABLE PARTS—CONTROL BOX (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
243	69		1	Lead & Lug Assembly	From 2 of amphenol recep. to top of AC recep.	AS-B-10116-58	PGEN	B,C,D,E
244	69		1	Lead & Lug Assembly	From Brush to −Bat. Term.	AS-B-10109	PGEN	B,C,D,E
245	69		1	Lead & Lug Assembly	From cutout to resistor	AS-B-10114-27	PGEN	B,C,D,E
246	69		1	Lead & Lug Assembly	From resistor to +Bat. term.	AS-B-10114-28	PGEN	B,C,D,E
247	Not illus.		1	Lead & Lug Assembly	Circuit Breaker to AC Brush	AS-B-10116-132	PGEN	D,E
248	Not illus.		1	Lead & Lug Assembly	Resistor to switch	AS-B-10114-33	PGEN	E
249	Not illus.		1	Lead & Lug Assembly	Push Button to battery	AS-B-10116-138	PGEN	E
250	Not illus.		1	Lead & Lug Assembly	Switch to Circuit Breaker	AS-B-10116-136	PGEN	E
251	Not illus.		1	Lead & Lug Assembly	Push Button to Relay	AS-B-10116-137	PGEN	E
252	68		1	Circuit Diagram Plate	To indicate complete unit wiring system	A-9557	PGEN	A
252-A	69		1	Circuit Diagram Plate	To indicate complete unit wiring system	D-10812	PGEN	B
252-B	69		1	Circuit Diagram Plate	To indicate complete unit wiring system	D-9665	PGEN	C
252-C	Not illus.		1	Circuit Diagram Plate	To indicate complete unit wiring system	D-11131	PGEN	D
252-D	Not illus.		1	Circuit Diagram Plate	To indicate complete unit wiring system	D-11335	PGEN	E
253	70		1	Filter Box	House filter parts	C-10741	PGEN	B,C,D,E
254	70		3	Choke Coil Assembly	For suppressing Radio Frequencies	AS-A-10804	PGEN	B,C,D,E
255	70		1	Condenser	To minimize spark in D-C line	#7206	GUDE	B,C,D,E
256	70		1	Condenser	To minimize spark in A-C line	#7207	GUDE	B,C,D,E

*Supplied as depot spares.
†Supplied as running spares in tool box.
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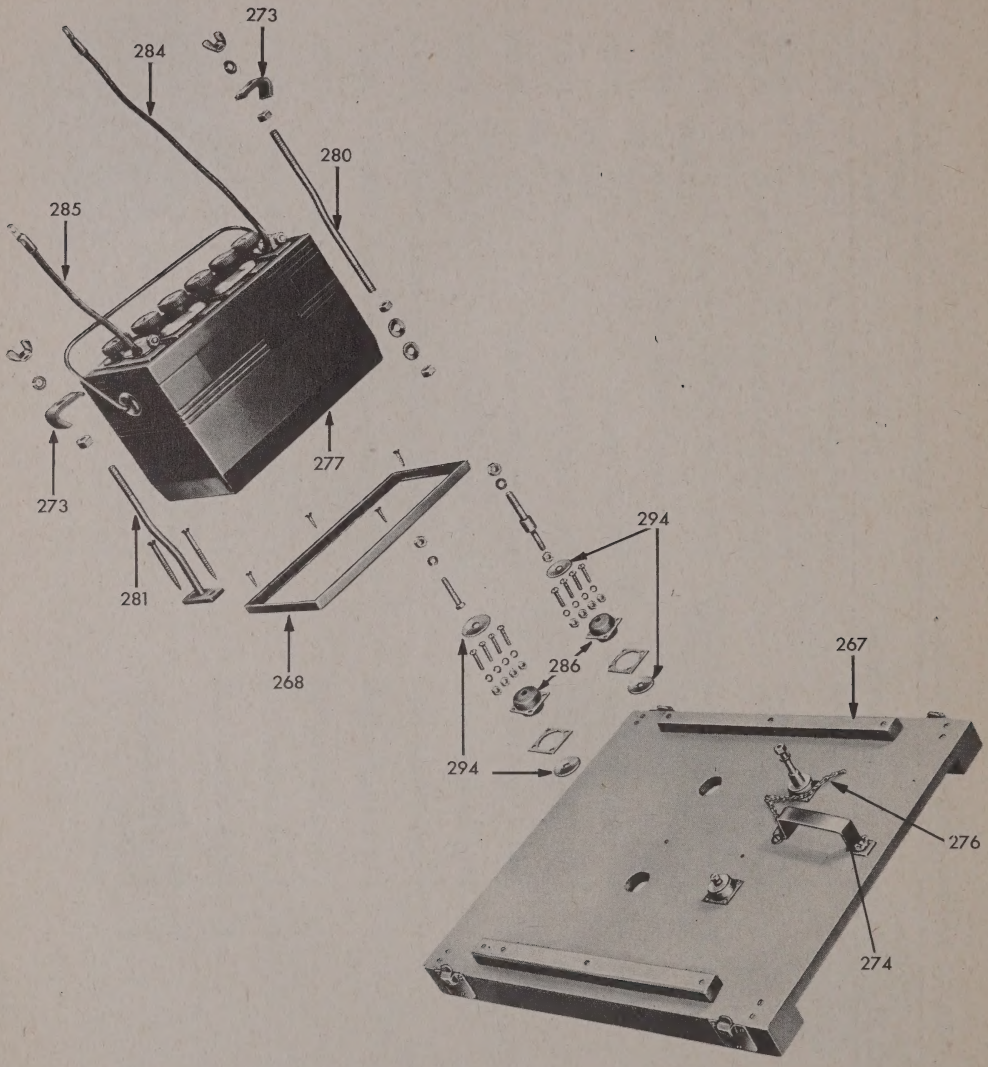

FIG. 71

BASE & BATTERY HOLD-DOWN PARTS—PE-108-A

29. TABLE OF REPLACEABLE PARTS—CONTROL BOX (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
257	70		1	Panel Assembly	To mount filter parts on		PGEN	B,C,D,E
258	70		1	Cutout	To prevent bat. from discharging into gen.		ELEC	B,C,D,E
259	70		1	Copper Strip	To connect cutout to #3 term. on filter	A-10788	PGEN	B,C,D
260	70		2	Lead & Lug Assembly	A-C brush to A-C choke (4 and 5 on filter)	AS-B-10116-49	PGEN	B,C
261	70		1	Lead & Lug Assembly	Filter can to bat. term.	AS-B-10114-29	PGEN	B,C,D,E
262	Not illus.		1	Lead & Lug Assembly	#4 to A-C Brush	AS-B-10116-134	PGEN	D,E
263	Not illus.		1	Lead & Lug Assembly	#5 to Circuit Breaker	AS-B-10116-131	PGEN	D
264	Not illus.		1	Lead & Lug Assembly	#6 to Ammeter	AS-B-10109-3	PGEN	D,E
265	Not illus.		1	Lead & Lug Assembly	#5 to Switch	AS-B-10116-135	PGEN	E

30. TABLE OF REPLACEABLE PARTS—BASE ASSEMBLY

266	Not illus.		1	Crate Cover Assembly	For covering complete equip. and mtg. on base	AS-9636	PGEN	A,B,C
266-A	Not illus.		1	Crate Cover Assembly	For covering complete equip. and mtg. on base	AS-E-11299	PGEN	D,E
267	71		1	Base Assembly	For mtg. complete equip.	AS- -9637	PGEN	A
267-A	72, 73		1	Base Assembly	For mtg. complete equip.	C-10747	PGEN	B,C
267-B	Not illus.		1	Base Assembly	For mtg. complete equip.	AS-D-11301	PGEN	D,E
268	71		1	Battery Platform	For mtg. battery on base	9618	PGEN	A
268-A	72		1	*Battery Platform	For mtg. battery on base	C-10749	PGEN	B,C
269	72		4	*Corner Piece	For mtg. battery on base	A-11099	PGEN	B,C
270	Not illus.		1	Battery Platform	For mtg. battery on base	C-11289	PGEN	D,E

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‡Supplied as running spares in tool box.
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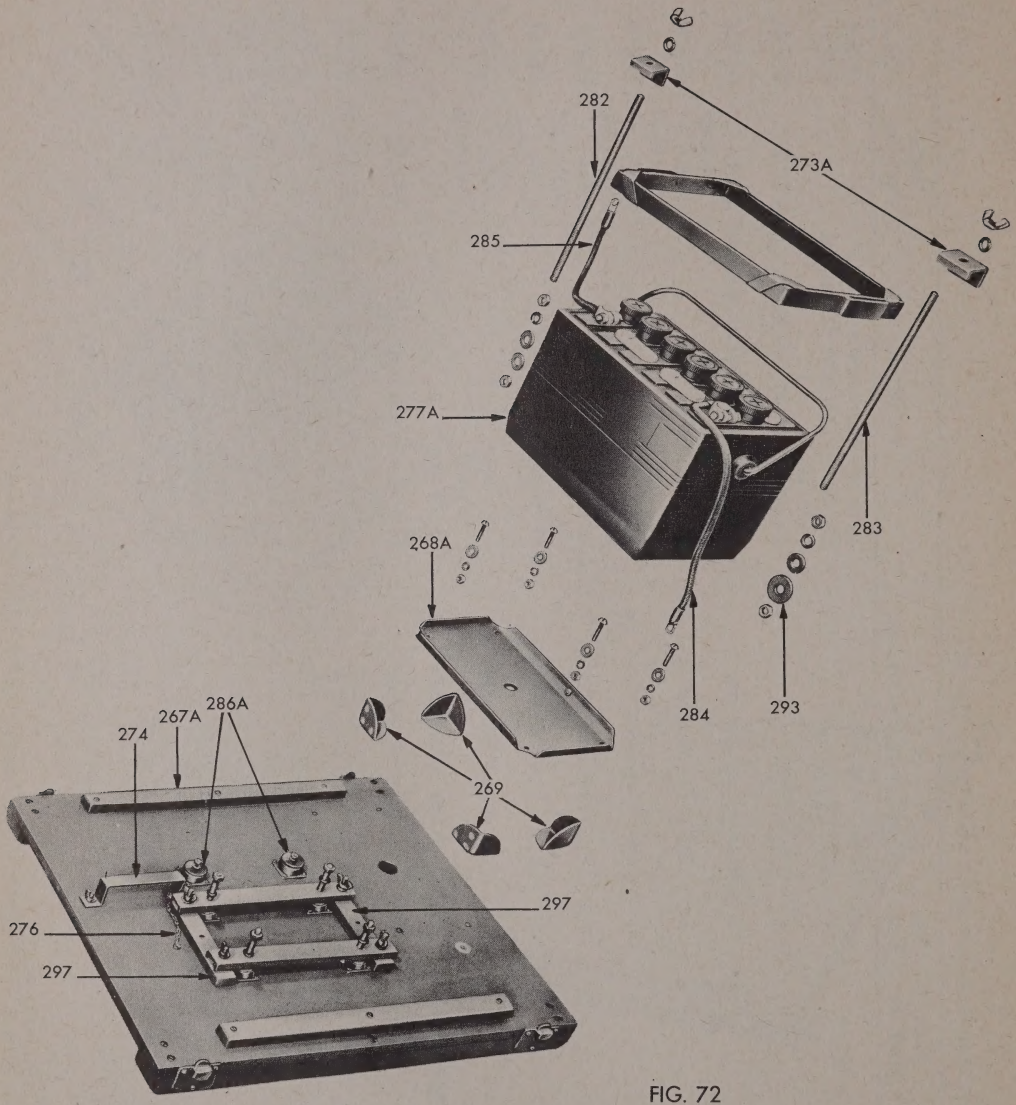

FIG. 72

BASE & BATTERY HOLD-DOWN PARTS—PE-108-B, C

30. TABLE OF REPLACEABLE PARTS—BASE ASSEMBLY (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
271	72		1	Battery Hold Down	For holding bat. in plat.	C-10747	PGEN	B,C
272	Not illus.		1	Battery Hold Down	For holding bat. in plat.	C-11288	PGEN	D,E
273	71		2	*Battery Clamp	For locking bat. in place	A-9639	PGEN	A
273-A	72		2	*Battery Clamp	For locking bat. in place	A-10853	PGEN	B,C,D,E
274	71, 72		1	*Exhaust Clamp	For fastening exhaust tubing to base	A-9554	PGEN	A,B,C,D,E
275	Not illus.		1	*Anchor Bolt	For mounting outer end of exhaust clamp to base	9620	PGEN	A,B,C,D,E
276	71, 72		1	Chain	To fasten exhaust clamp to base	9622	PGEN	A,B,C,D,E
277	71		1	*Battery	To supplying power for starting	RH-9-6	WILL	A,
277-A	72		1	*Battery (dry uncharged with rubber separators)	To supplying power for starting	Type 129-HSR	PTRO	B,C
277-B	Not illus.		1	*Battery (dry uncharged with wood separators)	To supplying power for starting	Type 129-HS	PRTO	D,E
278	Not illus.		1	1½ gal. Electrolyte	For filling battery		WILL	A,B,C
279	Not illus.		4	Funnel	For filling bat. with electrolite	#156	VORT	B,C,
280	71		1	*Battery Bolt	For mtg. bat. clamp to bat.	A-9633	PGEN	A
281	71		1	*Battery Bolt	For mtg. bat. clamp to bat.	A-9634	PGEN	A
282	72		1	*Battery Bolt	For mtg. bat. clamp to bat.	A-10841	PGEN	B,C,D,E
283	72		1	*Battery Bolt	For mtg. bat. clamp to bat.	A-10806	PGEN	B,C,D,E
284	71, 72		1	+Battery Cable Assembly	For connecting +gen. term. to bat.	AS-A-9537	PGEN	A,B,C,D,E
285	71, 72		1	−Battery Cable Assembly	For connecting −gen. term. to bat.	AS-A-9538	PGEN	A,B,C,D,E
286	71		4	Lord Mounting	Mounted under unit to take up shock	SK-532-11	LORD	A
286-A	72, 73		6	*Lord Mounting	Mounted under unit to take up shock	SK-532-11	LORD	A B,C,D,E
287	71		4	Back Plate	For preventing Lord mtg. screws from pulling through base	A-9640	PGEN	A
287-A	73		6	Back Plate	For preventing Lord mtg. screws from pulling through base	A-9640	PGEN	B,C,D,E
288	71		2	Studs	For mounting gas engine to Lord Mounts	A-9641	PGEN	A

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

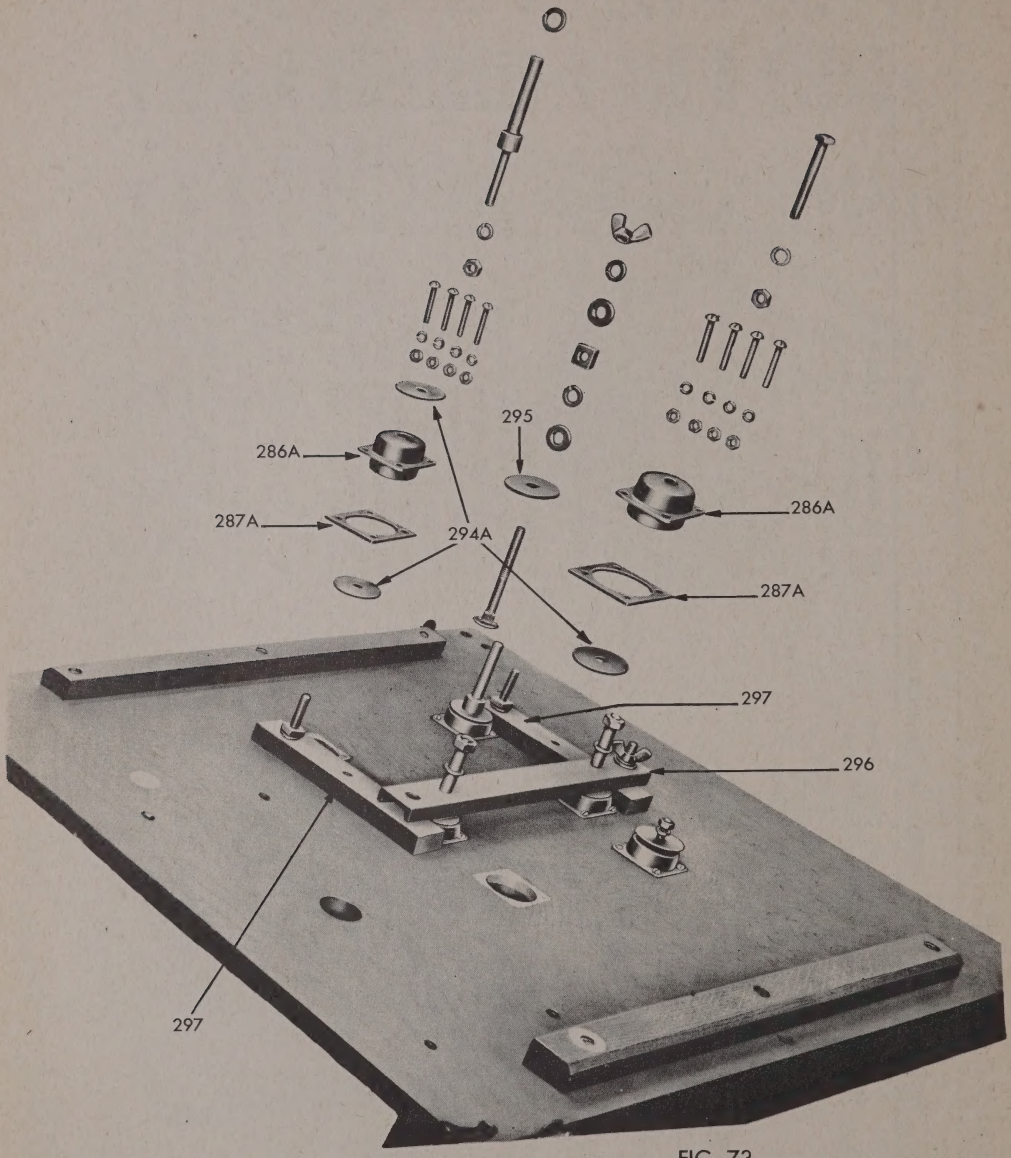

FIG. 73

MOUNTING PARTS DETAIL—PE-108-B, C, D, E

30. TABLE OF REPLACEABLE PARTS—BASE ASSEMBLY (Cont.)

Ref. No.	Fig. No.	S.C. Stock No.	No. Req.	Name and Description	Function	Mfr's Part No.	Mfg.	Used on** PE-108
288-A	73		4	Studs	For mounting gas engine to Lord Mounts	A-10730	PGEN	B,C,D,E
289	Not illus.		1	¾″ Pipe Nipple 5″ Lg.	For connecting engine exhaust elbow to pipe coupling	9551	CRAN	A,B,C,D,E
290	Not illus.		1	¾″ Pipe Coupling	For connecting pipe nipple to exhaust assembly	9552	CRAN	A
291	Not illus.		1	*¾″ Pipe Union	For connecting pipe nipple to exhaust assembly	11220	CRAN	B,C,D,E
292	Not illus.		1	*Exhaust Assembly	For carrying away exhaust fumes	AS-C-9484	PGEN	A,B,C,D,E
293	72		1	*Washer (Spec.)	To mount battery bolt	9536-3	PGEN	B,C,D,E
294	71		6	*Washer (Spec.)	Used under and on top of Lord Mounts	9556-3	PGEN	A
294-A	73		10	*Washer (Spec.)	Used under and on top of Lord Mounts	9556-3	PGEN	B,C,D,E
295	73		4	*Washer (Spec.)	Used on gas engine hold down studs	A-11104	PGEN	B,C,D,E
296	73		2	Channel	Used for gas engine hold down	A-11107	PGEN	B,C,D,E
297	72, 73		2	Wood Cleat	Used for gas engine hold down	A-11109	PGEN	B,C,D,E
298	Not illus.		1	Spacer Washer	Used under +Battery cable clamp	A-11130	PGEN	D,E

*Supplied as depot spares.
‡Supplied as running spares in tool box.
**Letters under heading "Used on PE-108" indicate that part is used only on the models of PE-108 listed.

31. TABLE OF STANDARD NUTS, BOLTS, SCREWS, AND WASHERS.

Size	Lgth.	Thrd.	Description	Used on PE-108-( )	Function
1/4	1/2	28	Hex. Head Cap Screw Stl.	A,B,C,D,E	2—For mtg. automatic choke to engine
1/4	1/2	20	Hex. Head Cap Screw Stl.	A,B,C,D,E	2—Gov. support bracket
1/4	1/2	20	Hex. Head Cap Screw Stl.	A,B,C,D,E	4—Main brg. plate flywheel end
1/4	1/2	20	Hex. Head Cap Screw Stl.	A,B,C,D,E	1—Exhaust muffler elbow
1/4	3/4	20	Hex. Head Cap Screw Stl.	A,B,C,D,E	10—Mtg. engine base
1/4	3/4	20	Hex. Head Cap Screw Stl.	A,B,C	2—Fuel tank strap
1/4	3/4	20	Hex. Head Cap Screw Stl.	D,E	1—For air filter bracket brace
1/4	3/4	20	Hex. Head Cap Screw Stl.	A,B,C,D,E	2—Mtg. oil trough
1/4	1 3/4	28	Hex. Head Cap Screw Stl.	A	2—For mtg. gen. support to Lord Mounting
1/4	2	28	Hex. Head Cap Screw Stl.	B,C,D	2—For mtg. gen. support to Lord Mounting
1/4	2	20	Hex. Head Cap Screw Stl.	A,B,C,D,E	1—Valve tappet plate
5/16	5/8	24	Hex. Head Cap Screw Stl.	A,B,C,D,E	2—For mtg. control box to shell
5/16	3/4	18	Hex. Head Cap Screw Stl.	A,B,C,D,E	4—Main brg. plate
5/16	3/4	24	Hex. Head Cap Screw Stl.	A,B,C,D,E	6—For mtg. brackets to shell
5/16	1 1/4	18	Hex. Head Cap Screw Stl.	A,B,C,D,E	2—Cyl. head mounting
5/16	1 1/4	18	#1035 Stl. Double Heat Treat	A,B,C,D,E	2—Connecting rod
5/16	1 1/2	24	Hex. Head Cap Screw Stl.	A	4—For mtg. pole shoes on Shell
5/16	1 1/2	18	Hex. Head Cap Screw Stl.	A,B,C,D,E	1—Cyl. head and tank strap
5/16	1 5/8	24	Hex. Head Cap Screw Stl.	B,C,D,E	4—For mtg. pole shoes in shell
5/16	1 3/4	18	Hex. Head Cap Screw Stl.	A,B,C,D,E	Mtg. cylinder head (1)
5/16	2	18	Hex. Head Cap Screw Stl.	A,B,C,D,E	2—Mtg. cylinder head
5/16	3 1/2	24	Hex. Head Cap Screw Stl.	A,B,C,D,E	1—For mtg. armature and fan on engine crankshaft
3/8	3/4	24	Hex. Head Cap Screw Stl.	A	1—For mtg. shell to gen. support
3/8	3/4	16	Hex. Head Cap Screw Stl.	A,B,C,D,E	1—Mtg. gen. adaptor (top hole in line with gov.)
3/8	3/4		Hex. Head Cap Screw Stl.	D,E	2—For fuel tank support
4	5/16	40	Round Head Mach. Screw Stl.	A,B,C,D,E	2—Carburetor choke valve
4	3/8	40	Round Head Mach. Screw Stl.	A	3—For mtg. A-C voltmeter in control box
6	3/16	32	Round Head Mach. Screw Stl.	A,B,C,D,E	4—For mtg. nameplate to control box
6	1/4	32	Round Head Mach. Screw Stl.	A	2—For mtg. field resistor to end bracket
6	5/16	32	Round Head Mach. Screw Stl.	A,B,C,D,E	4—For mtg. amphenol receptacle to control box
6	3/8	32	Round Head Mach. Screw Stl.	A	4—For mtg. A-C brushes to holders
6	3/8	32	Round Head Mach. Screw Stl.	A,B,C,D,E	3—For mtg. Hubbell receptacle to control box
6	5/8	32	Round Head Mach. Screw Stl.	A,B,C,D,E	1—Magneto ground lead
8	1/4	32	Round Head Mach. Screw Stl.	B,C,D,E	2—For mtg. clamp for holding leads out of box

31. TABLE OF STANDARD NUTS, BOLTS, SCREWS, AND WASHERS. (Cont.)

Size	Lgtn.	Thrd.	Description	Used on PE-108-( )	Function
8	1/4	32	Round Head Mach. Screw Stl.	A,B,C,D,E	2—For mtg. end cover to generator bracket
8	1/4	32	Round Head Mach. Screw Stl.	A	2—For mtg. voltage regulator to control box
8	3/8	32	Round Head Mach. Screw Stl.	B,C,D,E	4—For mtg. filter assembly in control box
8	3/8	32	Round Head Mach. Screw Stl.	B,C,D,E	2—For mtg. voltage regulator to control box
8	3/8	32	Round Head Maxh. Screw Stl.	B,C,D,E	4—For mtg. filter cover to filter box
8	3/8	32	Round Head Mach. Screw Stl.	B,C,D,E	3—For mtg. condensers in filter
8	1	32	Round Head Mach. Screw Brass	B,C,D,E	6—For connection post on filter assembly
8	1 1/8	32	Round Head Mach. Screw Stl.	A	16—For mtg. Lord shock mts. to base
8	1 1/8	32	Round Head Mach. Screw Stl.	B,C,D,E	24—For mtg. Lord shock mts. to base
8	1 1/4	32	Round Head Mach. Screw Stl.	B,C	4—For mtg. battery tray
10	3/8	32	Round Head Mach. Screw Stl.	A	4—For mtg. brush holder yoke to end bracket
10	3/8	32	Round Head Mach. Screw Stl.	A	4—For connecting D-C leads to brush holder
10	3/8	32	Round Head Mach. Screw Stl.	A	2—For mtg. cutout in control box
10	3/8	32	Round Head Mach. Screw Stl.	A,B,C,D,E	2—For mtg. power relay in control box
10	3/8	32	Round Head Mach. Screw Stl.	A,B,C,D,E	6—For mtg. cover to control box
10	3/8	32	Round Head Mach. Screw Stl.	A,B,C	2—For mtg. ohmite resistor in control box
10	3/8	32	Round Head Mach. Screw Stl.	A	2—For mtg. A-C line filter in control box
10	3/8	32	Round Head Mach. Screw Stl.	A	2—For mtg. D-C line filter in control box
10	3/8	32	Round Head Mach. Screw Stl.	D,E	1—For mtg. ohmite resistor in control box
1/4	1/2	20	Round Head Mach. Screw Stl.	A,B,C,D,E	2—Mtg. air shroud to case
1/4	1 1/4	20	Round Head Mach. Screw Stl.	A,B,C,D,E	2—For mtg. fuel tank strap
1/4	1 1/2	20	Round Head Mach. Screw. Stl.	A,B,C	2—Fuel tank strap
5/16	1	18	Round Head Mach. Screw. Brass	A,B,C,D,E	1—Terminal post for connecting battery cable
5/16	1 1/4	18	Round Head Mach. Screw Brass	B,C,D,E	1—Terminal post for connecting battery cable
5/16	1 1/2	18	Round Head Mach. Screw Brass	A	1—Terminal post for connecting battery cable
#6	3/8	32	Fill. Head Mach. Screw Stl.	A,B,C,D,E	1—Mag. cam felt wick
#6	7/16	32	Fill. Head Mach. Screw Stl.	A,B,C,D,E	1—Carburetor idle adjusting
#6	1/2	32	Fill. Head Mach. Screw Stl.	A,B,C,D,E	4—Mtg. carn. float chamber cover
#8	5/16	32	Fill. Head Mach. Screw Stl.	A,B,C,D,E	1—Mtg. mag. condenser
#8	5/16	32	Fill. Head Mach. Screw Stl.	A,B,C,D,E	1—Breaker arm. term.
#8	5/16	32	Fill. Head Mach. Screw Stl.	A,B,C,D,E	1—Stationary bracket
#10	7/8	24	Fill. Head Mach. Screw Stl.	A,B,C,D,E	4—Mtg. mag. end cap
#8	3/4	32	Flat Head Mach. Screw Stl.	A,B,C,D,E	4—Magneto breaker plate
1/4	1/2	20	Flat Head Mach. Screw Stl.	A,B,C,D,E	4—Magneto flange mtg.
4	3/8		Round Head Wood Screw Stl.	A,B,C.D,E	4—For mtg. nameplate to crate

31. TABLE OF STANDARD NUTS, BOLTS, SCREWS, AND WASHERS. (Cont.)

Size	Lgth.	Thrd.	Description	Used on PE-108-( )	Function
8	3/4		Round Head Wood Screw Stl.	A,B,C,D,E	1—For fastening exhaust clamp chain to base
8	3/4		Flat Head Wood Screw Stl.	A	4—For mtg. battery platform on base
#10	3/4		Flat Head Wood Screw Stl.	D,E	6—For mtg. battery platform on base
10			Flat Head Wood Screw Stl.	A	2—For fastening battery hold down to base
#14	3/4		Washer Head Wood Screw Stl.	A,B,C,D,E	1—For mtg. inner end of exhaust to base clamp
5/16	3	18	Carriage Bolt and Nut	B,C,D,E	4—For holding down gas eng.
#2	3/8		Self Tapping Screw (Parker-Kalon Type Z R.H.)	A,B,C,D,E	2—Mtg. gen. adaptor oil trough cover
#4	1/4		Self Tapping Screw (Parker-Kalon Type A Stove Head)	A,B,C,D,E	4—Mounting name plate
#10	3/8	24	Sq. Hd. Cup Point Set Screw	A,B,C,D,E	2—For holding A-C brush holder in place on stud
1/4	3/4	20	Headless Cup Pt. Set Screw	A,B,C,D,E	2—Mfg. coil to frame
6	1/4	32	Heedless Allen Set Screw	A,B,C,D,E	1—Mount throttle lever to shaft
#6	1/4	32	Point Machine Screw	A,B,C,D,E	1—Carb. throttle valve to shaft
			Drive Screw	A,B,C,D,E	2—Mtg. nameplate to gen. shell
#4	3/8	40	Round Head Sems Type Scr. Stl.	B,C	3—For mtg. voltmeter to control
#4	3/8	40	Round Head Sems Type Scr. Stl.	D,E	6—For mtg. meters to control box
#6	5/16	32	Round Head Sems Type Scr. Stl.	B,C,D,E	2—For mtg. field resistor to end bracket
#6	5/16	32	Round Head Sems Type Scr. Stl.	B,C,D,E	4—For mtg. A-C brushes to hold.
#6	5/16	32	Round Head Sems Type Scr. Stl.	B,C,D,E	1—For connecting cond. lead to ground in mag. filter
#6	5/16	32	Round Head Sems Type Scr. Stl.	E	2—For mtg. restr. in cont. box
#8	5/16	32	Round Head Sems Type Scr. Stl.	B,C,D,E	3—For connecting A-C and D-C condensers to yoke bracket
#8	5/16	32	Round Head Sems Type Scr. Stl.	D,E	2—For mtg. circuit breaker
#10	5/16	32	Round Head Sems Type Scr. Stl.	B,C,D,E	4—For mtg. brush holder yoke to end bracket
#10	3/8	32	Round Head Sems Type Scr. Stl.	B,C,D,E	4—For mtg. D-C brushes to holders
4		40	Hex. Nut Stl.	A	3—For mtg. A-C volt meter in contact box
6		32	Hex. Nut Stl.	A	4—For mtg. amphenol receptacle in control box
6		32	Hex. Nut Stl.	A,B,C,D,E	2—For mtg. Hubbell receptacle in control box
6		32	Hex. Nut Stl.		2—Magneto ground stud
6		32	Hex. Nut Stl.	E	2—For mtg. resistor in cont. box

31. TABLE OF STANDARD NUTS, BOLTS, SCREWS, AND WASHERS. (Cont.)

Size		Description	Used on PE-108-( )	Function
8	32	Hex. Nut Stl.	A	16—For fastening Lord Mounts to base
8	32	Hex. Nut Stl.	B,C,D,E	24—For fastening Lord Mounts to base
8	32	Hex. Nut Stl.	B,C	4—For fastening battery tray to base
8	32	Hex. Nut Brass	B,C,D,E	18—For connection post on filter assembly
8	32	Hex. Nut Brass	B,C,D,E	3—For mtg. condensers in filter assembly
#10	32	Hex. Nut Stl.	A,B,C,D,E	2—For mtg. power relay in control box
#10	32	Hex. Nut Stl.	A,B,C	2—For mtg. Ohmite resistor in control box
#10	32	Hex. Nut Stl.	(A)	2—For mtg. cutout in control box
#10	32	Hex. Nut Stl.	(A)	2—For mtg. A-C line filter in control box
#10	32	Hex. Nut Stl.	(A)	2—For mtg. D-C line filter in control box
#10	32	Hex. Nut Stl.	A,B,C,D,E	1—For carb. throttle lever
#10	32	Hex. Nut Stl.	A,B,C,D,E	2—For gov. spring adj. screw
#10	32	Hex. Nut Stl.	D,E	1—For mtg. Ohmite resistor in control box
1/4	-28	Hex. Nut Stl.	A	4—For mtg. gas engine to Lord Mounts
1/4	-28	Hex. Nut Stl.	B,C,D,E	6—For mtg. gas engine and gen. to Lord Mts.
1/4	-28	Hex. Nut Stl.	A,B,C,D,E	1—Gov. cont. lever
1/4	-28	Hex. Nut Stl.	A,B,C,D,E	2—Mtg. carburetor
1/4	-28	Hex. Nut Stl.	A,B,C,D,E	3—Mtg. fuel tank straps
1/4	-28	Hex. Nut Stl.	A,B,C,D,E	1—Gov. spring adj. screw pin
1/4	-28	Hex. Nut Stl.	A,B,C,D,E	2—Mtg. fuel tank straps
5/16	-18	Hex. Jam Nut (Brass)	A,B,C,D,E	4—For holding terminal posts in control box
5/16	-24	Hex. Nut Stl.	A,B,C,D,E	2—Mtg. magneto
3/8	-16	Hex. Nut Stl.	A	2—For holding battery clamp to battery hold down
3/8	-16	Hex. Nut Stl.	A	2—For holding battery hold down to base
3/8	-16	Hex. Nut Stl.	B,C,D,E	4—For holding battery hold down to base
3/8	-24	Hex. Nut Stl.	A	2—For mtg. gas engine to Lord Mounts
3/8	-24	Hex. Nut Stl.	B,C,D,E	4—For mtg. gas engine to Lord Mounts
1/4	20	Wing Nut Stl.	A,B,C,D,E	1—For clamping exhaust clamp
5/16	18	Wing Nut Style "A" Stl.	B,C,D,E	4—For clamping gas engine to base
3/8	-16	Wing Nut Stl.	A,B,C,D,E	2—For tightening battery clamp on to battery
#6		Std. Lockwasher	(A)	4—For screws holding A-C brush holder cap
#6		Std. Lockwasher	A,B,C,D,E	4—Carb. float chamber cover
#6		Std. Lockwasher	A,B,C,D,E	1—Magneto ground stud
#6		Std. Lockwasher	A,B,C,D,E	1—Magneto cam felt wick

31. TABLE OF STANDARD NUTS, BOLTS, SCREWS, AND WASHERS. (Cont.)

Size	Lgth.	Thrd.	Description	Used on PE-108-( )	Function
#6			Std. Lockwasher	(A)	2—For mtg. resistor in end bracket
#8			Std. Lockwasher	B,C,D,E	24—For fastening Lord Mounts to base
#8			Std. Lockwasher	B,C	4—For mtg. battery frame to base
#8			Std. Lockwasher	A,B,C,D,E	2—For mtg. end cover to gen. bracket
#8			Std. Lockwasher	A	16—For fastening Lord shock mounts to base
#8			Std. Lockwasher	B,C,D,E	4—For mtg. filter box in control box
#8			Std. Lockwasher	B,C,D,E	18—For connection posts on filter assembly
#8			Std. Lockwasher	B,C,D,E	3—For mtg. condensers in filter
#8			Std. Lockwasher	B,C,D,E	4—For mtg. filter cover to filter box
#8			Std. Lockwasher	B,C,D,E	4—For mtg. voltage reg. assy.
#8			Std. Lockwasher	A,B,C,D,E	1—For mtg. breaker arm term.
#8			Std. Lockwasher	A,B,C,D,E	1—Mtg. stationary bracket
#8			Std. Lockwasher	A,B,C,D,E	1—For mtg. mag. condenser
#10			Std. Lockwasher	A	4—For mtg. brush holder yoke to end bracket
#10			Std. Lockwasher	A	4—For connecting D-C brushes to brush holder
#10			Std. Lockwasher	A,B,C,D,E	6—For mtg. cover to control box
#10			Std. Lockwasher	A,B,C,D,E	1—Carburetor throttle lever
#10			Std. Lockwasher	A,B,C,D,E	4—Mtg. magneto end plate
1/4			Standard Lockwasher	A	2—For mtg. automatic choke to engine shroud
1/4			Standard Lockwasher	A	4—For mtg. generator and engine to Lord Mounts
1/4			Standard Lockwasher	B,C,D,E	6—For mtg. generator and engine to Lord Mounts
1/4			Standard Lockwasher	A,B,C,D,E	2—Air shrouds to case
1/4			Standard Lockwasher	A,B,C,D,E	4—Main brg. plate flywheel end
1/4			Standard Lockwasher	A,B,C,D,E	2—Mtg. oil trough
1/4			Standard Lockwasher	A,B,C	3—For mtg. fuel tank straps
1/4			Standard Lockwasher	D,E	1—For air filter bracket brace
5/16			Standard Lockwasher	B,C,D,E	4—For tightening power unit to base
5/16			Standard Lockwasher	A,B,C,D,E	6—For bolts holding brackets to shell
5/16			Standard Lockwasher	A,B,C,D,E	1—For mtg. fan and armature
5/16			Standard Lockwasher	A,B,C,D,E	2—For mtg. control box to shell
5/16			Standard Lockwasher	A,B,C,D,E	4—For mtg. pole shoes into shell
5/16			Standard Lockwasher (heavy)	B,C,D,E	4—For tightening power unit to base

Size	Lgth.	Thrd.	Description	Used on PE-108-( )	Function
5/16			Standard Lockwasher	A,B,C,D,E	2—Mtg. magneto
5/16			Standard Lockwasher	A,B,C,D,E	3—Mtg. cylinder head
3/8			Standard Lockwasher	A	1—For mtg. shell to gen. support
3/8			Standard Lockwasher	A	2—For holding battery "Hold-Down" to base
3/8			Standarn Lockwasher	A	2—For mtg. gas engine to Lord Mounts
3/8			Standard Lockwasher	B,C,D,E	4—For mtg. gas engine to Lord Mounts
3/8			Standard Lockwasher	B,C,D,E	4—For holding battery "Hold-down" to base
3/8			Standard Lockwasher	A,B,C,D,E	4—Mtg. Generator adaptor
				D,E	2—For mtg. fuel tank bracket
#4			Type—Shakeproof	A	3—For mtg. A-C voltmeter in control box
#4			Type—Shakeproof	A,B,C,D,E	2—Carb. choke valve to lever
#6			Type—Shakeproof	A,B,C,D,E	4—For mtg. nameplate to control box
#6			Type—Shakeproof	A,B,C,D,E	4—For mtg. Amphenol in control box
#6			Type—Shakeproof	A,B,C,D,E	3—For mtg. Hubbell recp. in control box
#6			Type—Shakeproof	E	6—For connecting leads to push button switch
#8			Type—Shakeproof	A	2—For mtg. voltage regulator to control box
#8			Type—Shakeproof	B,C,D,E	4—For connecting A-C leads to Hubbell Recp.
#10			Type—Shakeproof	A,B,C,D,E	2—For mtg. power relay in control box
#10			Type—Shakeproof	A,B,C,D,E	2—For mtg. Ohmite resistor in control box
#10			Type—Shakeproof	A	2—For mtg. cutout in control box
#10			Type—Shakeproof	A	4—For connecting A-C leads to Hubbell Recp.
#10			Type—Shakeproof	A	2—For connecting A-C line filter in control box
#10			Type—Shakeproof	A	2—For connecting D-C line filter in control box
1/4			Type—Shakeproof	B,C,D,E	2—For mtg. automatic choke to engine shroud
5/16			Type—Shakeproof	A,B,C,D,E	4—For terminal post in control box
5/16			Type—Shakeproof	A,B,C,D,E	2—Connecting rod bolts
#8			Flat Plain Stl. Washer	B,C,D,E	12—Used on terminal posts in filter assembly
#8			Flat Plain Stl. Washer	B,C,D,E	2—Used to mount cutout to filter assembly
#8			Flat Plain Stl. Washer	B,C	4—Used to mount battery tray
#10			Flat Plain Stl. Washer	A	2—For mtg. power relay in control box
#10			Flat Plain Stl. Washer	A,B,C,D	2—For mtg. Ohmite resistor in control box
#10			Flat Plain Stl. Washer	A	2—For mtg. cutout in control box
#10			Flat Plain Stl. Washer	D,E	1—For mtg. Ohmite resistor in control box

31. TABLE OF STANDARD NUTS, BOLTS, SCREWS, AND WASHERS. (Cont.)

Size	Lgth.	Thrd.	Description	Used on PE-108-( )	Function
1/4			Flat Plain Stl. Washer	A	1—Used as spacer in mtg. condenser on pos. brush
1/4			Flat Plain Stl. Washer	A,B,C,D,E	1—To hold spring on automatic choke
1/4			Flat Plain Stl. Washer	A,B,C,D,E	10—For engine base
1/4			Flat Plain Stl. Washer	A,B,C,D,E	1—Gov. adj. screw pin
5/16			Flat Plain Brass Washer	A,B,C,D,E	4—Used on terminal post in control box
5/16			Flat Plain Stl. Washer	B,C,D,E	8—Used to tighten power unit to base
5/16			Flat Plain Stl. Washer		2—Mts. cylinder head
21/64			Flat Plain Stl. Washer	A,B,C,D,E	4—Main brg. plate T.O. end
3/8			Flat Plain Stl. Washer	A	2—For holding battery "Hold-down" to base
3/8			Flat Plain Stl. Washer	B,C,D,E	3—For holding battery "Hold-Down" to base
			1/16 dia. x 1/2 Lg. Cotter Pin	A,B,C,D,E	1—For connecting voltage regulator arm. to bracket
				A,B,C,D,E	1—For holding washer and spring in automatic choke
			1/32 x 3/8 Cotter Pin	A,B,C,D,E	1—Gov. control rod
			1/16 x 3/8 Cotter Pin	A,B,C,D,E	4—Gov. flyweight
			1/8 dia. 3/16 Lg. Brass Tubular Rivet	A	4—To mount circuit diagram plate on control box
			1/8 dia. x 1/9 Lg. Brass Tubular Rivet	B,C,D,E	4—To mount circuit diagram plate on control box
5/16 dia.			Steel Ball	A,B,C,D,E	2—Used on oil pump
3/16	19/32		Straight Pin	A,B,C,D,E	1—For oil pump plunger
3/16	1 1/2		Groove Pin	A,B,C,D,E	1—Rope starter
#3			Woodruff Key	A,B,C,D,E	1—Camshaft gear
#6			Woodruff Key	A,B,C,D,E	1—Mag. coupling hub mtg.
#13			Woodruff Key	A,B,C,D,E	1—Mtg. flywheel
1/4			Plain Lead Washer	A,B,C,D,E	1—For valve tapper plate
3/8			Slotted Pipe Plug	A,B,C,D,E	1—Timing inspection hole
5/8			Expansion Plug	A,B,C,D,E	2—Camshaft pin holes
1/8	3/4		Pipe Nipple	A,B,C	1—Mtg. fuel strainer
1/8	1		Pipe Nipple	D,E	1—Mtg. fuel strainer

Section V

ALPHABETICAL LIST OF MANUFACTURERS

Abbreviation	Manufacturer	Address
AIRM	Air Maze Corp	Cleveland, Ohio
AMCO	Amphenol Corp	Chicago, Illinois
ATLC	Atlantic India Rubber Co	Chicago, Illinois
STRO	Bendix-Stromberg Carburetor Co	South Bend, Indiana
CHAM	Champion Spark Plug Co	Toledo, Ohio
CRAN	Crane Co	Chicago, Illinois
CUTL	Cutler-Hammer, Inc	Chicago, Illinois
ELEC	Electra Mfrg. Co	Kansas City, Mo.
ERLA	Electrical Research Laboratories	Evanston, Illinois
FMCO	Fairbanks-Morse	Beloit, Wisconsin
GECO	General Electric Co	Schenectady, N. Y.
GUDE	Gudeman Co	Chicago, Illinois
HALI	Hallicrafters, Inc	Chicago, Illinois
HUBL	Hubble Electric Co	Chicago, Illinois
INDS	Industrial Condenser Co	Chicago, Illinois
FAST	John E. Fast Co	Chicago, Illinois
LECT	Lectrohm, Inc	Cicero, Illinois
LORD	Lord Mfg. Co	Erie, Pa.
OHME	Ohmite Mfrg. Co	Chicago, Illinois
PGEN	Pioneer Gen-E-Motor	Chicago, Illinois
PRTO	Presto-Lite Battery Co	Indianapolis, Indiana
RBMC	R. B. M. Mfg. Co	Fort Wayne, Indiana
SPEN	Spencer Thermostat Co	Chicago, Illinois
STER	Sterling Mfg. Co	Cleveland, Ohio
STEW	Stewart Stamping Co	New York, N. Y.
TILO	Tillotson Mfg. Co	Toledo, Ohio
TINN	Tinnerman Products	Chicago, Illinois
UNIS	United Specialties Co	Chicago, Illinois
VORT	Dixie Cup Company (Vortex)	Chicago, Illinois
WILL	Willard Storage Battery Co	Cleveland, Ohio
WISC	Wisconsin Motor Corp	Milwaukee, Wisc.

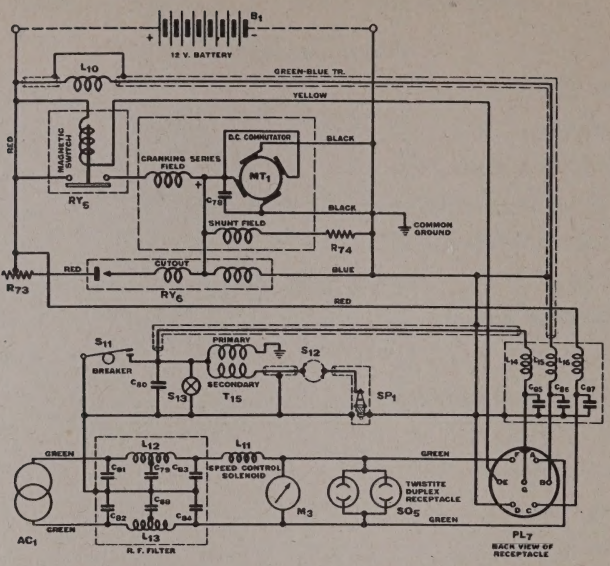

FIG. 74 - POWER UNIT PE-108-A SCHEMATIC DIAGRAM.

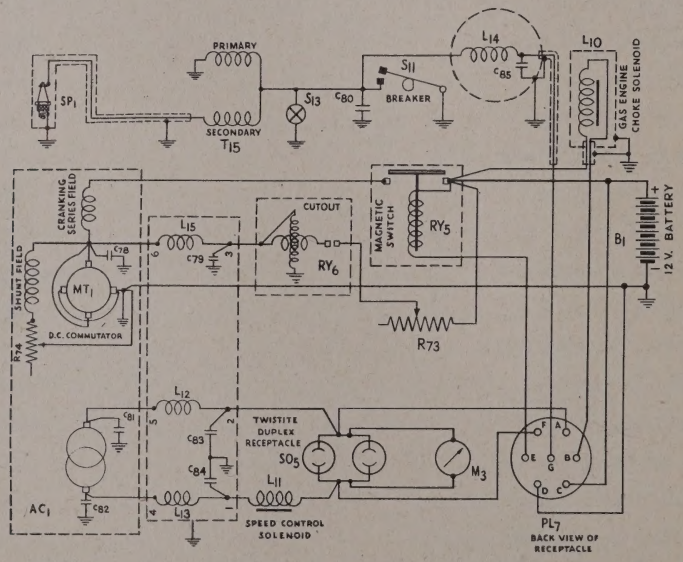

FIG. 75 - POWER UNIT PE-108-B AND C SCHEMATIC DIAGRAM

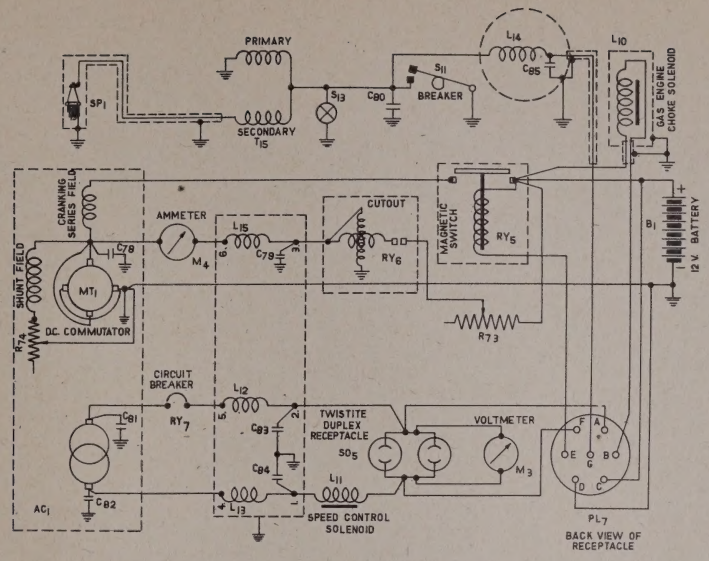

FIG. 76 - POWER UNIT PE-108-D SCHEMATIC DIAGRAM

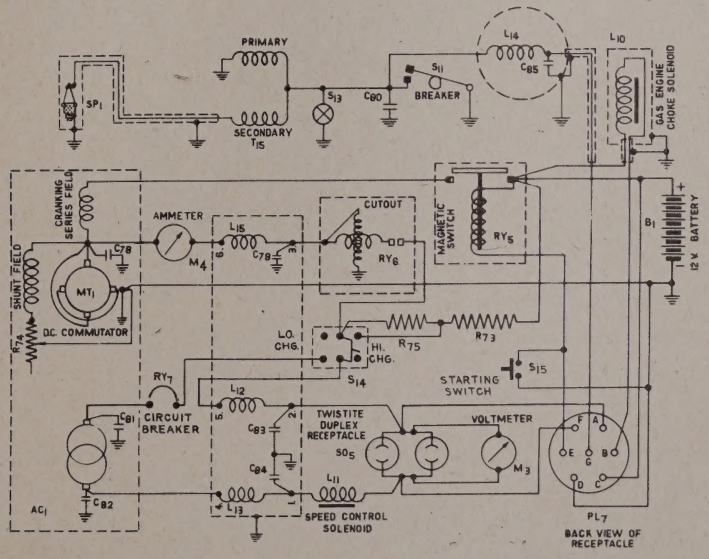

FIG. 77 - POWER UNIT PE-108-E SCHEMATIC DIAGRAM

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